THE INFLUENCE OF TEACHING STAFF UTILIZATION OF ARTIFICIAL INTELLIGENCE ON ACADEMIC RESEARCH METHODOLOGIES IN RIVERS STATE OWNED UNIVERSITIES

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Abstract

The study investigated the influence of teaching staff utilization of artificial intelligence on academic research methodologies in Rivers State owned universities. Descriptive survey research design was adopted for the study. The population of the study consisted of all the three thousand six hundred and twenty (2, 538) lecturers in the two Rivers State owned universities. A sample of 424 teaching staff comprising of 308 from Rivers State University (RSU) and 116 from Ignatius Ajuru University of Education (IAUoE) was selected. The instrument for data collection was a self-structured questionnaire entitled: "Influence of Teaching Staff Utilization of Artificial Intelligence on Academic Research Methodologies Questionnaire. The instruments used for data collection was face and content validated by two other experts from the Department of Measurement and Evaluation of the Faculty of Education in Rivers State University. A reliability index of 0.80 was obtained through Cronbach Alpha method. The research questions posed were answered using mean and standard deviation while z-test was used to test the formulated hypotheses. Findings of the study revealed that, teaching staff utilization of machine learning, natural language processing and data analytics influenced academic research methodologies in Rivers State owned universities. Based on the findings, the researcher made the following recommendations: teaching staff should incorporate machine learning concepts and techniques

into research methodology courses to enhance students' understanding and application of machine learning in research, teaching staff should be encouraged to use natural language processing tools and techniques to analyze and interpret text data in their research projects and teaching staff should incorporate data analytics concepts and techniques into research methodology courses to enhance students' understanding and application of data analytics in research.

Keywords: Influence, Teaching staff utilization, artificial intelligence, academic research methodologies

Introduction

The advent of artificial intelligence (AI) has significantly altered the way academic research is conducted, impacting everything from data collection and analysis to hypothesis generation and publication processes. AI technologies, particularly machine learning (ML), natural language processing (NLP), and data mining, are increasingly being integrated into research methodologies, allowing scholars to overcome traditional limitations and achieve more accurate, efficient, and innovative outcomes. The application of AI tools to academic research represents a paradigm shift that promises to redefine scholarly practices, providing researchers with powerful tools to handle vast datasets, identify patterns, and generate insights that were once unattainable with manual methods (Baker, 2020).

Machine learning algorithms, for example, have been employed to analyze large volumes of data, allowing researchers to draw meaningful conclusions from complex datasets in fields ranging from healthcare to social sciences (Chen et al., 2019). Similarly, natural language processing technologies have transformed literature review processes by automating the extraction and summarization of the extraction and summarization of key themes from academic articles, significantly reducing the time required for researchers to stay updated with new publications (Zhang et al, 2021). These technologies facilitate the discovery of connections across vast bodies of literature, enabling researchers to develop more comprehensive and nuanced research questions (Smith & Johnson, 2021).

However, the incorporation of artificial intelligence algorithms, which can result in skewed results if the data used to train the models is flawed or unrepresentative (He et al., 2020). Additionally, ethical considerations surrounding data privacy, transparency, and the risk of over-reliance on automated systems have sparked significant debate within the academic community. Researchers must be cautions to balance the advantages of artificial intelligence technologies with the

responsibility to uphold rigorous ethical standards and maintain human oversight in critical decision-making processes (O'Neil, 2016).

Despite the challenges, the use of AI in academic research offers vast potential to accelerate innovation, enhance research quality and democratize access to knowledge. This paper explores how AI is reshaping research methodologies, examining both the opportunities and limitations it presents.

Statement of the Problem

The integration of artificial intelligence (AI) into academic research methodologies offers significant promise for advancing the efficiency and depth of scholarly inquiry. However, the widespread adoption of AI-driven tools in research practices also presents numerous challenges that need to be addressed. While AI technologies, such as machine learning (ML), natural language processing (NLP), and data mining, have the potential to automate and streamline tasks like literature reviews, data analysis, and hypothesis generation, their implementation raises important issues related to data quality, algorithmic bias, and the ethical implications of relying on automated systems in academic research.

First, the quality and representativeness of data used to train AI models can lead to biased or skewed outcomes if not carefully monitored. AI algorithms are only as effective as the data fed into them, and any inherent bias within that data could propagate into the research findings, potentially leading to misleading or incomplete conclusions (He et al. 2020). Moreover, `while AI tools can expedite the research process, they risk overshadowing human judgement and critical thinking, which are vital components of scholarly inquiry. The question of how to balance automation with human oversight in AI-enhanced research remains a central issue.

Furthermore, the ethical concerns surrounding the use of AI in academic research are becoming increasingly significant. Issues related to data privacy, transparency in algorithmic decision-making, and the responsible use of AI are areas of concern that must be addressed to ensure the integrity of academic research (O'Neil, 2016). As AI tools continue to evolve, researchers and institutions must grapple with how to maintain ethical standards while leveraging these technologies. Given these challenges, there is a need for a comprehensive examination of how AI is reshaping academic research methodologies, particularly in terms of its potential benefits, limitations, and ethical implications. This research aims to explore these factors and provide a clearer understanding of how AI can be responsibly integrated into academic research to maximize its positive impact while mitigating potential risks.

Purpose of the Study

The purpose of the study is to investigate the influence of teaching staff utilization of artificial intelligence on academic research methodologies in Rivers State owned universities. Specifically, the study sought to

1. Determine the extent to which teaching staff utilization of machine learning influence research methodologies in Rivers State owned universities.
2. Examine the extent to which teaching staff utilization of natural language learning influence research methodologies in Rivers State owned universities.
3. Ascertain the extent to which teaching staff utilization of data analytics influence research methodologies in Rivers State owned universities.

Research Questions

The following research questions guided the study:

1. To what extent does teaching staff utilization of machine learning influence research methodologies in Rivers State owned universities?
2. To what extent does teaching staff utilization of natural language processing influence research methodologies in Rivers State owned universities?
3. To what extent does teaching staff utilization of data analytics influence research methodologies in Rivers State owned universities?

Research Hypotheses

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

1. There is no significance difference on the mean responses of teaching staff of Rivers State University and Ignatius Ajuru University on the extent teaching staff utilization of machine learning influence research methodologies in Rivers State owned universities.
2. There is no significance difference on the mean responses of teaching staff of Rivers State University and Ignatius Ajuru University on the extent teaching staff utilization of natural language processing influence research methodologies in Rivers State owned universities.
3. There is no significance difference on the mean responses of teaching staff of Rivers State University and Ignatius Ajuru University on the extent teaching staff utilization of data analytics influence research methodologies in Rivers State owned universities.

Methodology

This study adopted descriptive survey research design. The population of the study consisted of all the three thousand six hundred and twenty (2, 538) lecturers in the two Rivers State owned universities. Source: Academic Planning Unit of the Universities (2024 Report). A sample of four hundred and twenty-four (424) teaching staff comprising of 308 from Rivers State University (RSU) and 116 from Ignatius Ajuru University of Education (IAUoE) was selected. This sample was drawn through stratified random sampling technique. The instrument for data collection was a self-structured questionnaire entitled: "Influence of Teaching Staff Utilization of Artificial Intelligence on Academic Research Methodologies Questionnaire (ITSUAIARMQ)". The instrument which had 18 items was structured with Four Point Likert rating scale of Very High Extent (VHE=4 points), High Extent (HE=3 points), Low Extent (LE=2 points) and Very Low Extent (VLE=1 point). The instrument was well validated and reliability index of 0.80 was obtained through Cronbach Alpha method. Mean, standard deviation and mean set were used to analyze the research questions while z-test was used to test the hypotheses at 0.05 level of significance.

Results

Research Question 1: To what extent does teaching staff utilization of machine learning influence research methodologies in Rivers State owned universities?

Table 1: **Mean and Standard Deviation on the Extent Teaching Staff Utilization of Machine Learning Influence Research Methodologies**

S/No	Items	RSU Teaching Staff		IAUoE Teaching Staff		Remark
		Mean $\ddot{x}_1$	SD_1	Mean $\ddot{x}_2$	SD_2	
1	Utilization of machine learning influences data handling	3.03	0.97	3.02	0.89	HE
2	Utilization of machine learning influences validation	3.10	0.98	3.05	0.87	HE
3	Utilization of machine learning influences the ability to collect and analyze data	3.08	0.92	3.07	0.98	HE

4	Utilization of machine learning influences the ability to interpret and explain results	3.02	0.93	3.00	0.90	HE
5	Utilization of machine learning influences measures technical skills such as programming languages, frameworks, and tools	3.28	0.90	3.30	0.88	HE
6	Utilization of machine learning influences the level of proficiency	3.31	0.88	3.30	0.78	HE
	Grand/Mean/SD	**3.14**	**0.93**	**3.12**	**0.88**	**HE**

The data presented in Table 1 shows that the responses of the respondents for items 1, 2, 3, 4, 5 and 6 had mean score of 3.03, 3.10, 3.08, 3.02, 3.28 and 3.31 for RSU teaching staff and 3.02, 3.05, 3.07, 3.00, 3.30 and 3.30 for IAUoE teaching staff respectively; this implies that the respondents to a high extent agree that, utilization of machine learning influences data handling, validation, the ability to collect and analyze data, the ability to interpret and explain results, measures technical skills such as programming languages, frameworks, and tools, and the level of proficiency. However, the table also revealed a grand mean of 3.14 for RSU teaching staff and 3.12 for IAUoE teaching staff indicating that indices mentioned above are teaching staff utilization of machine learning influencing research methodologies in Rivers State owned universities. The standard deviation values range from 0.88 to 0.98 for RSU 0.78 to 0.98 for IAUoE respondents, indicating a close response from respondents on all items.

Research Question 2: To what extent does teaching staff utilization of natural language processing influence research methodologies in Rivers State owned universities?

Table 2: **Mean and Standard Deviation on the Extent Teaching Staff Utilization of Natural Language Processing Influence Research Methodologies**

S/No	Items	RSU Teaching Staff		IAUoE Teaching Staff		Remark
		Mean $\ddot{x}_1$	SD_1	Mean $\ddot{x}_2$	SD_2	
7	Utilization of natural language processing influences the ability to analyze and extract insights from text data	3.14	0.89	2.90	0.90	HE
8	Utilization of natural language processing influences the ability to detect and analyze sentiment in text data	3.11	0.99	3.10	0.98	HE
9	Utilization of natural language processing influences the ability to identify and analyze topics in large data text datasets	3.95	0.91	3.99	0.94	HE
10	Utilization of natural language processing influences the ability to build and evaluate language models	3.02	0.83	3.00	1.00	HE
11	Utilization of natural language processing influences the ability to identify, and extract named entities from text data	3.22	0.80	3.24	0.91	HE
12	Utilization of natural language processing influences the level of proficiency in concepts, techniques, and tools	2.98	0.98	3.13	0.97	HE
	Grand Mean/SD	**3.24**	**0.90**	**3.23**	**0.95**	**HE**

The data presented in Table 1 shows that the responses of the respondents for items 7, 8, 9, 10, 11 and 12 had mean score of 3.14, 3.11, 3.95, 3.02, 3.22 and 2.98 for RSU teaching staff and 2.90, 3.10, 3.99, 3.00, 3.24 and 3.13 for IAUoE teaching staff respectively; this implies that the respondents to a high extent agree that, utilization of natural language processing influences the

ability to analyze and extract insights from text data, the ability to detect and analyze sentiment in text data, the ability to identify and analyze topics in large data text datasets, the ability to build and evaluate language models, the ability to identify, and extract named entities from text data and the level of proficiency in concepts, techniques, and tools. However, the table also revealed a grand mean of 3.24 for RSU teaching staff and 3.23 for IAUoE teaching staff indicating that indices mentioned above are teaching staff utilization of natural language processing influencing research methodologies in Rivers State owned universities. The standard deviation values range from 0.80 to 0.99 for RSU 0.90 to 1.00 for IAUoE respondents, indicating a close response from respondents on all items.

Research Question 3: To what extent does teaching staff utilization of data analytics influence research methodologies in Rivers State owned universities?

Table 3: **Mean and Standard Deviation on the Extent Teaching Staff Utilization of Data Analytics Influence Research Methodologies**

S/No	Items	RSU Teaching Staff		IAUoE Teaching Staff		Remark
		Mean $\ddot{x}_1$	SD_1	Mean $\ddot{x}_2$	SD_2	
13	Utilization of data analytics help in identifying areas for improvement and enhance the overall quality of research	3.20	0.79	3.14	0.81	HE
14	Utilization of data analytics increases the correctness of validity of findings.	3.09	0.85	3.18	0.86	HE
15	Utilization of data analytics increases the correctness of reliability of findings.	3.08	0.95	3.06	0.94	HE
16	Utilization of data analytics streamlines productivity	3.11	0.98	3.09	0.89	HE
17	Utilization of data analytics reduces errors	3.14	0.91	3.07	0.83	HE
18	Utilization of data analytics improves productivity	3.10	0.86	3.00	0.90	HE
	Grand Mean/SD	**3.12**	**0.89**	**3.09**	**0.87**	**HE**

The data presented in Table 1 shows that the responses of the respondents for items 13, 14, 15, 16, 17 and 18 had mean score of 3.20, 3.09, 3.08, 3.11, 3.14 and 3.10 for RSU teaching staff and 3.14,

3.18, 3.06, 3.09, 3.07 and 3.00 for IAUoE teaching staff respectively; this implies that the respondents to a high extent agree that, utilization of data analytics help in identifying areas for improvement and enhance the overall quality of research, increases the correctness of validity of findings, increases the correctness of reliability of findings, streamlines productivity, reduces errors, and improves productivity. However, the table also revealed a grand mean of 3.12 for RSU teaching staff and 3.09 for IAUoE teaching staff indicating that indices mentioned above are teaching staff utilization of data analytics influencing research methodologies in Rivers State owned universities. The standard deviation values range from 0.79 to 0.98 for RSU 0.81 to 0.94 for IAUoE respondents, indicating a close response from respondents on all items.

Hypothesis 1: There is no significance difference on the mean responses of teaching staff of Rivers State University and Ignatius Ajuru University on the extent teaching staff utilization of machine learning influence research methodologies in Rivers State owned universities.

Table 4: z-Test Analysis on the Extent Teaching Staff Utilization of Machine Learning Influence Research Methodologies in Rivers State Owned Universities

Respondents	N	$\bar{X}$	SD	DF	LS	z-cal	z-crit	Decision
RSU Teaching Staff	308	3.14	0.93	422	0.05	0.20	±1.96	Failed to Reject No Significant Difference
IAUoE Teaching Staff	116	3.02	0.88					

Table 4 reveals a summary of the mean, standard deviation, and z-test of difference between the RSU and IAUoE teaching staff on the extent teaching staff utilization of machine learning influence research methodologies in Rivers State owned universities. The z-test calculated which was by far less than the z-critical and was used in testing the hypothesis stood at 0.20 while z-critical was $\pm$ 1.96 at 422 degrees of freedom using 0.05 level of significance. Since the z-calculated value is less than the z-critical value, the null hypothesis was retained. This implies that, there was no significant difference between the mean scores of teaching staff of Rivers State University and Ignatius Ajuru University on the extent teaching staff utilization of machine learning influence research methodologies in Rivers State owned universities.

Hypothesis 2: There is no significance difference on the mean responses of teaching staff of Rivers State University and Ignatius Ajuru University on the extent teaching staff utilization of natural language processing influence research methodologies in Rivers State owned universities.

Table 5: z-Test Analysis on the Extent Teaching Staff Utilization of Natural Language Processing Influence Research Methodologies in Rivers State Owned Universities

Respondents	N	$\bar{X}$	SD	DF	LS	z-cal	z-crit	Decision
RSU Teaching Staff	308	3.24	0.90	422	0.05	0.10	±1.96	Failed to Reject No Significant Difference
IAUoE Teaching Staff	116	3.23	0.95					

Table 5 reveals a summary of the mean, standard deviation, and z-test of difference between the RSU and IAUoE teaching staff on the extent teaching staff utilization of natural language processing influence research methodologies in Rivers State owned universities. The z-test calculated which was by far less than the z-critical and was used in testing the hypothesis stood at 0.10 while z-critical was + 1.96 at 422 degrees of freedom using 0.05 level of significance. Since the z-calculated value is less than the z-critical value, the null hypothesis was retained. This implies that, there was no significant difference between the mean scores of teaching staff of Rivers State University and Ignatius Ajuru University on the extent teaching staff utilization of of natural language processing influence research methodologies in Rivers State owned universities.

Hypothesis 3: There is no significance difference on the mean responses of teaching staff of Rivers State University and Ignatius Ajuru University on the extent teaching staff utilization of data analytics influence research methodologies in Rivers State owned universities.

Table 6: z-Test Analysis on the Extent Teaching Staff Utilization of Data Analytics Influence Research Methodologies in Rivers State Owned Universities

Respondents	N	$\bar{X}$	SD	DF	LS	z-cal	z-crit	Decision
RSU Teaching Staff	308	3.12	0.89	422	0.05	0.30	±1.96	Failed to Reject No Significant Difference
IAUoE Teaching Staff	116	3.09	0.87					

Table 6 reveals a summary of the mean, standard deviation, and z-test of difference between the RSU and IAUoE teaching staff on the extent teaching staff utilization of natural language processing influence research methodologies in Rivers State owned universities. The z-test calculated which was by far less than the z-critical and was used in testing the hypothesis stood at 0.30 while z-critical was + 1.96 at 422 degrees of freedom using 0.05 level of significance. Since the z-calculated value is less than the z-critical value, the null hypothesis was retained. This implies that, there was no significant difference between the mean scores of teaching staff of Rivers State University and Ignatius Ajuru University on the extent teaching staff utilization of data analytics processing influence research methodologies in Rivers State owned universities.

Discussion of Findings

The findings on research question 1 with respect to the extent teaching staff utilization of machine learning influence research methodologies in Rivers State owned universities and a grand mean of 3.14 and 3.12 for RSU and IAUoE teaching staff respectively indicated that the respondents to a high extent agreed to the statements that, utilization of machine learning influences data handling, validation, the ability to collect and analyze data, the ability to interpret and explain results, measures technical skills such as programming languages, frameworks, and tools, and the level of proficiency. This finding agreed with the finding of Raza, Qamar, Shirin, Fatima, Aslam, & Parveen (2023) that machine learning algorithms have transformative potential in natural language processing, enhancing research methodologies with applications in text analysis, predictive modeling, and data visualization.

The corresponding hypothesis 1 revealed that there was no significant difference between the mean scores of teaching staff of Rivers State University and Ignatius Ajuru University on the extent teaching staff utilization of machine learning influence research methodologies in Rivers State owned universities. With z-calculated value of 0.20 which is less than the z-critical value of ±1.96 at 0.05 level of significance, the null hypothesis was accepted.

The findings on research question 2 with respect to the extent teaching staff utilization of natural language processing influence research methodologies in Rivers State owned universities and a grand mean of 3.24 and 3.23 for RSU and IAUoE teaching staff respectively indicated that the respondents to a high extent agreed to the statements that, utilization of natural language processing influences the ability to analyze and extract insights from text data, the ability to detect and analyze sentiment in text data, the ability to identify and analyze topics in large data text datasets, the ability to build and evaluate language models, the ability to identify, and extract named entities from text data and the level of proficiency in concepts, techniques, and tools. This

finding agreed with the finding of Allen, Creer, & Oncel (2022) that natural language processing enables personalized learning, predicting student achievement, and providing formative feedback.

The corresponding hypothesis 2 revealed that there was no significant difference between the mean scores of teaching staff of Rivers State University and Ignatius Ajuru University on the extent teaching staff utilization of natural language processing influence research methodologies in Rivers State owned universities. With z-calculated value of 0.10 which is less than the z-critical value of ±1.96 at 0.05 level of significance, the null hypothesis was accepted.

The findings on research question 3 with respect to the extent teaching staff utilization of data analytics influence research methodologies in Rivers State owned universities and a grand mean of 3.12 and 3.09 for RSU and IAUoE teaching staff respectively indicated that the respondents to a high extent agreed to the statements that, utilization of data analytics help in identifying areas for improvement and enhance the overall quality of research, increases the correctness of validity of findings, increases the correctness of reliability of findings, streamlines productivity, reduces errors, and improves productivity. This finding agreed with the finding of Dwivedi & Dwivedi (2022) that data analytics, when combined with natural language processing and machine learning, can enhance research methodologies by providing valuable insights, improving prediction accuracy, and enabling informed decision-making.

The corresponding hypothesis 3 revealed that there was no significant difference between the mean scores of teaching staff of Rivers State University and Ignatius Ajuru University on the extent teaching staff utilization of data analytics influence research methodologies in Rivers State owned universities. With z-calculated value of 0.30 which is less than the z-critical value of ±1.96 at 0.05 level of significance, the null hypothesis was accepted.

Conclusion

Based on the findings from the study, it is concluded that utilization of artificial intelligence influences teaching staff academic research methodologies in Rivers State owned universities. Hence, its components such as machine learning, natural language processing, and data analytics to a high influence teaching staff academic research methodologies in Rivers State owned universities to a high extent.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. Teaching staff should incorporate machine learning concepts and techniques into research methodology courses to enhance students' understanding and application of machine learning in research.
2. Teaching staff should be encouraged to use natural language processing tools and techniques to analyze and interpret text data in their research projects.
3. Teaching staff should incorporate data analytics concepts and techniques into research methodology courses to enhance students' understanding and application of data analytics in research.

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