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Awareness and Utilization of Artificial Intelligence (AI) Tools for Enhanced Research among Postgraduate Students in Universities in Benue State

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Abstract:- The credibility of research outputs from Nigerian universities raises concerns, especially among postgraduate students.in view of this, the study investigated Awareness and utilization of Artificial Intelligence (AI) Tools for Enhanced Research among Postgraduate Students in Universities in Benue State. The study adopted a descriptive survey design. A sample of 231 postgraduate students participated in the study. The convenience sampling technique was used to obtain the sample. A self-constructed questionnaire titled Awareness and Utilization of AI Tools Questionnaire was used for data collection. The research questions were answered using mean and standard deviation, and the hypotheses were tested using one-way analysis of variance (ANOVA). Major findings revealed that there is a significant difference in the mean ratings of postgraduate students based on programme type on the level of awareness of AI tools for enhance research in universities in Benue State, and there is a significant difference in the mean ratings of postgraduate students based on programme type on the extent of utilization of AI tools for enhance research in universities in Benue State. Based on the findings, it was recommended among other things that faculties/departmental heads should organize Seminars and workshops aim at intimating postgraduate students on the use of various AI tools for enhanced research.

Keywords:- *Research; Artificial Intelligence; Postgraduate Students; Awareness of AI; Utilization of AI.*

I. INTRODUCTION

Every researcher hopes to conduct research that is relevant to the demands of the twenty-first century. However, the credibility of research outputs from Nigerian universities raises concerns. Major limitations in Nigerian university research include low motivation, low and irregular funding, outmoded research equipment, an insufficient number of competent research workers, a general lack of research emphasis, and poor connection between researchers and the industrial sector (Yusuf, 2012). Research in Nigerian institutions is hampered by duplication of research materials, a high incidence of plagiarism, and a relatively low level of awareness, accessibility, and use of internet resources (Enamudu & Akonedo, 2021). These constraints severely limit the research capacity and capabilities of researchers in Nigerian universities. As a result, there is a need to address this concern, particularly among postgraduate students, who play an important role in university research.

Postgraduate students are those who are formally enrolled in a university course of study with the goal of earning a master's degree, doctorate, or postgraduate diploma (Ph.D.). The most important part of postgraduate studies is research. Nigeria's postgraduate education programs require research (Federal Ministry of Information, 2012). One of the key requirements for receiving a postgraduate degree or diploma is the submission of an original essay, also known as a project, thesis, or dissertation. To discover methods for changing situations, educational modifications or developments are being prepared in the project for a postgraduate diploma in education, thesis for a master's degree in education, or a doctoral degree dissertation (Olibie, Agu, & Uzoechina, 2015). The authors state that postgraduate students are expected to choose an appropriate research topic in a field of study that warrants further inquiry. It is expected that the found issue will meet the three criteria for originality, importance, and viability. Aside from these requirements, students writing dissertations must consider any concerns they discover with their own proficiency and job experience, as well as prospective challenges such as data availability, funding constraints, and time constraints. Additionally, some academic institutions mandate that projects, theses, and dissertations be defended in viva-voce oral exams, in which applicants report their findings to a panel of experts.

Graduate students who want to expand or add to the current state of knowledge must learn how to undertake a methodical study based on the work of their peers in the field through postgraduate research. Mostly, postgraduate research

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functions as an apprenticeship program to acquire proficiency in methodical research procedures (Muluta, 2011). Postgraduate students conduct research by writing and publishing in journals, conferences, and seminars. These actions are often intended to contribute new knowledge to their subject and acquire specialised skills. Yusuf (2019), discussing postgraduate students' research, decried the low quality of research among students in Northern Nigeria. In Benue State, it has been noticed that many postgraduate students face a wide range of challenges relating to writing, information retrieval, and presenting unique work. This has had a sardonic effect on postgraduate students' research, as some spent more than the minimum duration for their program and struggled with writing articles for publication. Thus, the use of ICT has become necessary for these postgraduate students' research activities as it may provide quicker and easier access to wide-ranging and current information. However, little is known about postgraduate students' level of awareness and utilization of artificial intelligence (AI) technologies for research.

The terms "artificial" and "intelligence," where "artificial" refers to something created by humans and "intelligence" refers to thought, combine to form artificial intelligence (AI). In other words, artificial intelligence (AI) is a man-made technology with thinking capabilities. Grewal (2014) defines artificial intelligence (AI) as a subfield of computer science that emphasises on creating machines that are able to carry out tasks that typically require human intelligence. Data-driven learning, reasoning, problem-solving, understanding natural language, and environmental observation are some of these tasks. Among the numerous subfields of artificial intelligence include computer vision, robotics, natural language processing, and machine learning (Rayhan, 2023). The goal of AI research is to develop systems that can mimic or even exceed human capabilities in specific domains. Industries including healthcare, transportation, retail, and finance are among those it quickly transforms (Russell and Norvig, 2018). Another field with enormous potential for using AI technology is education (Guan, Mou, & Jiang, 2020). AI has made instructional materials readily available to students at all educational levels. Education has advanced significantly as a result of the ongoing development of smart learning, teaching, and management strategies (Lei, 2018). By integrating AI technologies into educational research, researchers can gain deeper insights into learning processes, improve educational outcomes, and develop more effective teaching methods and tools.

Artificial intelligence (AI) tools are software applications or systems that automate operations that would normally need human intelligence. According to Laxmi, Devi, Thanjavur, and Buddolla (2024), AI-powered research tools have transformed how researchers conduct, analyse, and evaluate studies in a variety of domains. Some popular AI-powered research tools include ChatGPT, ChatPDF, Consensus, Scite, QuillBot, Bit AI, Litmaps, Jenni, Paperpal, Research Rabbit, Wordvice AI, Typeset.io, Scholarcy, ProofHub, Trinka, and Elicit, among others. For example, ChatGPT is designed to interpret and generate human-like prose, allowing for interesting conversations and instructive responses on a variety of themes (Atlas, 2023). It can answer specific queries about one's study topic and help with the early phases of a literature review by recommending key papers and authors. ChatPDF is another AI research tool that allows you to interact with PDFs using chat commands. It is an artificial intelligence (AI) that reads PDFs and answers questions about them. Consensus is used to identify legitimate scientific findings from published sources. Scite.ai, on the other hand, is a platform that provides citation analysis, plagiarism detection, and literature review capabilities.

Generally speaking, postgraduate students can significantly increase productivity and efficiency by employing AI-driven tools for research. According to Srivastava and Agarwal (2024), AI research tools have the ability to automate laborious processes such as summarising, organising research materials into documents, and optimising the process. Faster data analysis is another advantage of adopting an AI tool for research, as AI and machine learning algorithms can analyse big datasets far more quickly than manual approaches (Sarker, 2021). By offering relevant literature summaries, associated keywords, and phrases, these tools can help promote the production of ideas. Looking at the benevolent benefits of AI-driven tools for researchers, it is imperative for postgraduate students to adopt the utilization of these tools for enhanced research. However, there is a paucity of literature on the level of awareness and utilization of these tools by postgraduate students. This underscores the need for a study of this kind.

➢ *Research Questions*

- What is the level of awareness of AI tools for enhanced research among postgraduate students in universities in Benue State?
- What is the extent of utilization of AI tools for enhance research among postgraduate students in universities in Benue State?
- What are the challenges associated with the utilization of AI tools for enhanced research among postgraduate students in universities in Benue State?
- What are the strategies to enhance utilization of AI tools for enhanced research among postgraduate students in universities in Benue State?

➢ *Hypotheses*

Two null hypotheses guided the study and were tested at 0.05 level of significance.

- **H_{O1}:** There is no significant difference in the mean ratings of postgraduate students based on programme type on the level of awareness of AI tools for enhanced research in universities in Benue State.
- **H_{O2}:** There is no significant difference in the mean ratings of postgraduate students based on programme type on the extent of utilization of AI tools for enhance research in universities in Benue State.

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II. MATERIALS AND METHODS

The survey design used in the study was descriptive. Since a descriptive study examines a group of individuals or objects by the collection and analysis of data from a small number of subjects deemed to be a representative sample of the total population, it was chosen (Nworgu, 2015). Since the study aimed to gather information from a sample of postgraduate students in universities in Benue State, which is thought to be a representative sample of postgraduate students in universities in Benue State, the design is deemed suitable. The sample of the study was 231 postgraduate students from 2 public universities offering postgraduate programmes. The convenience sampling technique was used to obtain the sample. Convenience sampling is a category of the non-probability sampling technique that allows researchers to select mainly members of the population that can be conveniently reached during the period of the study (Etikan, Musa, & Alkassim, 2016). The postgraduate students in the selected schools who participated in the study conveniently gave their consent in responding to the survey.

A self-constructed questionnaire titled Awareness and Utilization of AI Tools Questionnaire. There were two sections (A and B) on the questionnaire. The respondents' demographic data is shown in Section A. There are 46 items in Section B, divided into four clusters. The 15 items in Cluster A measure postgraduate students' understanding of AI technologies for improved research and are based on a four-point grading system: Highly Aware (HA), Aware (A), Less Aware (LA), and Not Aware (NA). Cluster B comprises fifteen questions that are rated on a four-point scale representing Very High Extent (VHE), High Extent (HE), Low Extent (LE), and Very Low Extent (VLE) to gauge how much postgraduate students use AI tools to improve their study. Cluster C includes eight items modelled on a four-point rating scale of strongly agree (SA), agree (A), disagree (D), and severely disagree (SD), which measure the challenges connected with the use of AI tools for increased research. Cluster D has 8 items based on a four-point rating scale of strongly agree (SA), agree (A), disagree (D), and strongly disagree (SD), which measure techniques for improving the use of AI technologies for increased research. The instrument was face validated by three specialists from the University of Agriculture, Makurdi: two from the Science Education Department and one from the Computer Science Department. The suggestions made by experts were used to modify the final version of the instrument, which was then pilot tested on a separate sample of postgraduate students (n = 20) who shared similar characteristics with the sample of the study to determine its reliability. The instrument was considered reliable because the analysis produced Cronbach's alpha coefficients of 0.75, 0.79, 0.83, and 0.82 for clusters A, B, C, and D, respectively, with an overall reliability of 0.80 (Cohen, Manion, & Morrison, 2011). The face-to-face method of data collection was employed in this study. This approach enabled the first author to visit the two universities under investigation to administer the instrument with the aid of two research assistants. The completed questionnaires were collected by the researcher and recorded for data analysis.

Version 26 of the Statistical Package for Social Sciences (SPSS) was used to analyse the data that had been gathered. While the one-way analysis of variance (ANOVA) was utilised to assess the proposed hypotheses, the mean and standard deviation were employed to address the study research questions. Real limits of numbers with ranges of 3.50-4.00 for very high extent, 2.50-3.49 for high extent, 1.50-2.49 for low extent, and 0.5-1.49 for very low extent were utilised to determine the answers to research questions 1 and 2. Decisions were made using a benchmark of 2.50 for research questions 3 and 4. An item was deemed to be acceptable if its mean was 2.50 or higher, and rejected if its mean was less than that. This is because all the clusters are modeled on 4-point rating scales with response options 4, 3, 2, and 1; hence, the average of the rating points is 2.50.

III. RESULTS

This section presents the result of the data collected and analysed in line with the research questions and hypotheses that guided the study.

A. Research Question One

What is the level of awareness of AI tools for enhance research among postgraduate students in universities in Benue State?

Table 1: Mean and Standard Deviation of Postgraduate Students on the Level of Awareness of AI Tools for Enhance Research

S/N	Item Statement	$\bar{x}$	SD	Dec
1	ChatGPT	3.36	0.48	HE
2	ChatPDF	2.26	0.71	LE
3	Consensus	2.33	0.79	LE
4	Scite	2.21	0.78	LE
5	Quillbot	2.66	0.82	HE
6	Bit AI	2.13	0.71	LE
7	Litmaps	2.13	0.71	LE
8	Jenni	2.07	0.64	LE
9	Paperpal	2.09	0.73	LE
10	Research Rabbit	2.13	0.70	LE
11	Wordvice AI	2.25	0.80	LE
12	Typeset.io	2.10	0.62	LE
13	Elicit	2.23	0.74	LE

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14	Scholarcy	2.14	0.72	LE
15	Trinka	2.46	0.70	LE
	Cluster Mean	2.30	0.31	LE

Key: N = Number of respondents, $\bar{x}$ = mean, SD = Standard Deviation, HE = High Extent, LE = Low Extent, Dec. = Decision.

Result presented in Table 1 showed the mean and standard deviations of postgraduate students on the level of awareness of AI tools for enhanced research in universities in Benue State. Result showed that items 1 and 5 had mean ratings of 3.36 and 2.66 with standard deviations of 0.48 and 0.82 respectively. These mean ratings are within the range of 2.50-3.49 set as benchmark for "Aware". This implies that postgraduate students are aware of ChatGPT and Quillbot AI tools for enhanced research. Result also shows that items 2-4 and 6-15 had mean of 2.26, 2.33, 2.21, 2.13, 2.13, 2.07, 2.09, 2.13, 2.25, 2.10, 2.23, 2.14 and 2.46 with standard deviations of 0.71, 0.79, 0.78, 0.71, 0.71, 0.64, 0.73, 0.70, 0.80, 0.62, 0.74, 0.72 and 0.70 respectively. These mean ratings are within the range of 1.50-2.49 set as benchmark for "Less Aware". This implies that postgraduate students are less aware of ChatPDF, Consensus, Scite, Bit AI, and Litmaps among others for enhanced research. The cluster mean of 2.30 is also within the range of 1.50-2.49 set as benchmark for "Less Aware". The cluster mean of 2.30 with a standard deviation of 0.31 shows that postgraduate students are less aware of AI tools for enhanced research in universities in Benue State.

➢ *Hypothesis One*

There is no significant difference in the mean ratings of postgraduate students based on programme type on the level of awareness of AI tools for enhance research in universities in Benue State.

Table 2: ANOVA of the Difference in the Mean Ratings of Postgraduate Students Based on Programme Type on the Level of Awareness of AI Tools for Enhance Research

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**	**Decision**
Between Groups	8.744	2	4.372	71.212	0.00	S
Within Groups	13.998	228	.061			
Total	22.742	230				

Table 2 shows ANOVA result of the difference in the mean ratings of postgraduate students based on programme type on the level of awareness of AI tools for enhance research in universities in Benue State. The result showed an f-ratio of 71.21 with the significant value of 0.00. Since the significant value is less than 0.05 set as level of significance, it means that the null hypothesis is rejected. Inference drawn is that, there is a significant difference in the mean ratings of postgraduate students based on programme type on the level of awareness of AI tools for enhance research in universities in Benue State. This implies that programme type is a significant factor in determining the level of awareness of AI tools for enhance research in universities in Benue State. To test for the direction of the difference, see posthoc below:

Table 3: Post Hoc Test of the Comparison between the Mean

(I) HQualification	**(J) HQualification**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**Dec.**
PGD	M.Sc	-.27423*	.04806	.000	S
	Ph.D	-.67083*	.05814	.000	S
M.Sc	PGD	.27423*	.04806	.000	S
	Ph.D	-.39660*	.04304	.000	S
Ph.D	PGD	.67083*	.05814	.000	S
	M.Sc	.39660*	.04304	.000	S

Note: S = Significant, NS = Not Significant.

The result in Table 3 is a multiple comparison test of the difference in the mean ratings of postgraduate students based on programme type on the level of awareness of AI tools for enhance research in universities in Benue State. The result showed that there was a significant difference among the mean ratings of postgraduate students pursuing PGD, M.Sc and Ph.D. Therefore, the direction of the difference in hypothesis one is between the mean ratings of postgraduate students pursuing PGD, M.Sc and Ph.D when compare with each other.

B. Research Question Two

What is the extent of utilization of AI tools for enhance research among postgraduate students in universities in Benue State?

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Table 4: Mean and Standard Deviation of Postgraduate Students on the Extent of Utilization of AI Tools for Enhance Research

S/N	Item Statement	$\bar{x}$	SD	Dec
1	ChatGPT	2.81	0.86	HE
2	ChatPDF	1.98	0.59	LE
3	Consensus	1.99	0.78	LE
4	Scite	2.03	0.77	LE
5	Quillbot	2.57	0.74	HE
6	Bit AI	2.10	0.83	LE
7	Litmaps	2.00	0.88	LE
8	Jenni	2.14	0.88	LE
9	Paperpal	1.88	0.60	LE
10	Research Rabbit	1.84	0.76	LE
11	Wordvice AI	1.89	0.76	LE
12	Typeset.io	1.92	0.76	LE
13	Elicit	1.91	0.73	LE
14	Scholarcy	1.96	0.81	LE
15	Trinka	1.87	0.74	LE
	Cluster Mean	2.06	0.35	LE

Key: N = Number of respondents, $\bar{x}$ = mean, SD = Standard Deviation, HE = High Extent, LE = Low Extent, Dec. = Decision.

Result presented in Table 4 showed the mean and standard deviations of postgraduate students on the extent of utilization of AI tools for enhanced research in universities in Benue State. Result showed that items 1 and 5 had mean ratings of 2.81 and 2.57 with standard deviations of 0.86 and 0.74 respectively. These mean ratings are within the range of 2.50-3.49 set as benchmark for "High Extent". This implies that there is high extent of utilization of ChatGPT and Quillbot AI tools among postgraduate students for enhanced research. Result also shows that items 2-4 and 6-15 had mean of 1.98, 1.99, 2.03, 2.10, 2.00, 2.14, 1.88, 1.84, 1.89, 1.92, 1.91, 1.96 and 1.87 with standard deviations of 0.59, 0.78, 0.77, 0.83, 0.88, 0.88, 0.60, 0.76, 0.76, 0.76, 0.73, 0.81 and 0.74 respectively. These mean ratings are within the range of 1.50-2.49 set as benchmark for "Low Extent". This implies that there is low extent of utilization of ChatPDF, Consensus, Scite, Bit AI, Litmaps and others, among postgraduate students for enhanced research. The cluster mean of 2.06 is also within the range of 1.50-2.49 set as benchmark for "Low Extent". The cluster mean of 2.06 with a standard deviation of 0.35 shows that there is low extent of utilization of AI tools for enhanced research in universities in Benue State.

➢ *Hypothesis Two*

There is no significant difference in the mean ratings of postgraduate students based on programme type on the extent of utilization of AI tools for enhance research in universities in Benue State.

Table 5: ANOVA of the Difference in the Mean Ratings of Postgraduate Students Based on Programme Type on the Extent of Utilization of AI Tools for Enhance Research

	Sum of Squares	df	Mean Square	F	Sig.	Decision
Between Groups	5.870	2	2.935	29.495	0.00	S
Within Groups	22.689	228	.100			
Total	28.560	230				

Table 5 shows ANOVA result of the difference in the mean ratings of postgraduate students based on programme type on the extent of utilization of AI tools for enhance research in universities in Benue State. The result showed an f-ratio of 29.50 with the significant value of 0.00. Since the significant value is less than 0.05 set as level of significance, it means that the null hypothesis is not accepted. Inference drawn is that, there is a significant difference in the mean ratings of postgraduate students based on programme type on the extent of utilization of AI tools for enhance research in universities in Benue State. This implies that programme type is a significant factor in determining the extent of utilization of AI tools for enhance research in universities in Benue State.

Table 6: Post Hoc Test of the Comparison between the Mean

(I) HQualification	(J) HQualification	Mean Difference (I-J)	Std. Error	Sig.	Dec.
PGD	M.Sc	-.00975	.06119	.987	NS
	Ph.D	-.42133*	.07402	.000	S
M.Sc	PGD	.00975	.06119	.987	NS
	Ph.D	-.41158*	.05480	.000	S
Ph.D	PGD	.42133*	.07402	.000	S
	M.Sc	.41158*	.05480	.000	S

Note: S = Significant, NS = Not Significant.

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The result in Table 6 is a multiple comparison test of the difference in the mean ratings of postgraduate students based on programme type on the extent of utilization of AI tools for enhance research in universities in Benue State. The result showed that there was a significant difference between the mean ratings of postgraduate students pursuing Ph.D when compared with their counterparts pursuing PGD and M.Sc. Therefore, the direction of the difference in hypothesis two is between the mean ratings of postgraduate students pursuing Ph.D when compared with their counterparts pursuing PGD and M.Sc.

C. Research Question Three

What are the challenges associated with the utilization of AI tools for enhanced research among postgraduate students in universities in Benue State?

Table 7: Mean and Standard Deviation of Postgraduate Students on the Challenges Associated with the Utilization of AI Tools for Enhanced Research

S/N	Item Statement	$\bar{x}$	SD	Dec
1	Bias and fairness	3.66	0.54	A
2	Data privacy and security concerns	3.44	0.62	A
3	Complexity and usability	3.43	0.67	A
4	Leads to over dependence on technology	3.44	0.64	A
5	Ethical considerations	3.38	0.63	A
6	Cost and accessibility	3.43	0.65	A
7	Issues with quality of output	3.35	0.67	A
8	Balancing AI tools with conventional research techniques	3.34	0.70	A
	Cluster Mean	3.43	0.32	A

Key: N = Number of respondents, $\bar{x}$ = mean, SD = Standard Deviation, A = Agree, Dec. = Decision.

Result presented in Table 7 showed the mean and standard deviations of postgraduate students on the challenges associated with the utilization of AI tools for enhanced research in universities in Benue State. Result showed that items 1-8 had mean ratings of 3.66, 3.44, 3.43, 3.44, 3.38, 3.43, 3.35 and 3.34 with standard deviations of 0.54, 0.62, 0.67, 0.64, 0.63, 0.65, 0.67 and 0.79 respectively. These mean ratings are above the criterion mean of 2.50 set for accepting an item. This implies that respondents agreed that bias and fairness, data privacy and security concerns, complexity and usability, and leads to over dependence of technology among others are the challenges associated with the utilization of AI tools for enhanced research. The cluster mean of 3.43 is also above the criterion mean of 2.50 set as benchmark for accepting an item. The cluster mean of 3.43 with a standard deviation of 0.32 shows that there are challenges associated with the utilization of AI tools for enhanced research among postgraduate students in universities in Benue State.

D. Research Question Four

What are the strategies to enhance utilization of AI tools for enhanced research among postgraduate students in universities in Benue State?

Table 8: Mean and Standard Deviation of Postgraduate Students on the Strategies to Enhance Utilization of AI Tools for Enhanced Research

S/N	Item Statement	$\bar{x}$	SD	Dec
1	Train students on how to control bias and fairness	3.38	0.65	A
2	Institutional licenses for AI tools to ensure access	3.45	0.66	A
3	Promote peer learning and collaboration to ease usability	3.74	0.50	A
4	Students should avoid over dependence on technology	3.46	0.62	A
5	Educate students about the ethical implications of using AI tools	3.48	0.67	A
6	Grant and funding	3.47	0.63	A
7	Workshops and seminars the use of AI tools for research	3.40	0.69	A
8	Integration of AI utilization with research methods	3.39	0.64	A
	Cluster Mean	3.47	0.33	A

Key: N = Number of respondents, $\bar{x}$ = mean, SD = Standard Deviation, A = Agree, Dec. = Decision.

Result presented in Table 7 showed the mean and standard deviations of postgraduate students on the strategies to enhance utilization of AI tools for enhanced research in universities in Benue State. Result showed that items 1-8 had mean ratings of 3.38, 3.45, 3.74, 3.46, 3.48, 3.47, 3.40 and 3.39 with standard deviations of 0.65, 0.66, 0.50, 0.62, 0.67, 0.63, 0.69 and 0.64 respectively. These mean ratings are above the criterion mean of 2.50 set for accepting an item. This implies that respondents agreed that, train students on how to control bias and fairness, institutional license for AI tools to ensure access, promote peer learning and collaboration to ease usability, students should avoid over dependence on technology among others are the strategies to enhance utilization of AI tools for enhanced research. The cluster mean of 3.47 is also above the criterion mean of 2.50 set as benchmark for accepting an item. The cluster mean of 3.47 with a standard deviation of 0.33 shows that there are strategies to enhance utilization of AI tools for enhanced research among postgraduate students in universities in Benue State.

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IV. DISCUSSION

The study revealed that postgraduate students are less aware of AI tools for enhanced research in universities in Benue State. According to the findings, postgraduate students are less aware of ChatPDF, Consensus, Scite, Bit AI, and Litmaps, among other AI tools for enhanced research. Further analysis revealed that there is a significant difference in the mean ratings of postgraduate students based on program type and the level of awareness of AI tools for enhanced research in universities in Benue State. This implies that program type is a significant factor in determining the level of awareness of AI tools for enhanced research in universities in Benue State. The finding is feasible because students are not exposed to AI-driven research tools; hence, it may be possible for students to be unaware of these tools. The finding is consistent with Yadav et al. (2024), who discovered a substantial difference in knowledge levels, with postgraduates displaying a more thorough awareness of AI applications in dentistry than undergraduates. This shows that awareness of AI tools is dependent on program type, as revealed by the present study. The finding is also consistent with Alordiah, Osagiede, Omumu, Okokoyo, Emiko-Agbajor, Chenube, and Oji (2023), who found a low level of awareness, knowledge, and utilization of the Free Online Digital Tool (FODT). This also indicates a low level of awareness of digital technologies among members of the university community, as revealed by the present study. Hence, in line with previous findings, the present study adds to the empirical literature that postgraduate students are less aware of AI tools for enhanced research in universities in Benue State.

The study also revealed that there is a low extent of utilization of AI tools for enhanced research in universities in Benue State. However, there was a high extent of utilization of ChatGPT and QuillBot AI tools among postgraduate students for enhanced research. Further analysis revealed that there is a significant difference in the mean ratings of postgraduate students based on program type and the extent of utilization of AI tools for enhanced research in universities in Benue State. This implies that program type is a significant factor in determining the extent of utilization of AI tools for enhanced research in universities in Benue State. The finding is feasible because Ph.D. students may be more exposed to research and possibly utilize AI-driven research tools more than their counterparts pursuing masters and postgraduate diplomas. The finding is consistent with Alordiah, Osagiede, Omumu, Okokoyo, Emiko-Agbajor, Chenube, and Oji (2023), who found a low level of awareness, knowledge, and utilization of the Free Online Digital Tool (FODT). This is in line with the findings of the present study as revealed in research question two. The finding is also consistent with Kasumu and Agbarakwe (2024), who indicated that students who are interested in technology often participate in extracurricular activities such as coding clubs, robotics competitions, or STEM programs, and these activities provide hands-on experience with AI-related tools and concepts, fostering a deeper understanding of technology utilization. By implication, utilization of AI-related tools is not common among students except for those interested. A study by Stöhr, Ou, and Malmström (2024) also reveals broad awareness and use of ChatGPT among students, but not of other AI chatbots. This further buttress the findings of this present study. Hence, in line with previous findings, the present study provides the basis to conclude that there is a low extent of utilization of AI tools for enhanced research in universities in Benue State.

More so, the study revealed that there are challenges associated with the utilization of AI tools for enhanced research among postgraduate students in universities in Benue State. According to respondents, bias and fairness, data privacy and security concerns, complexity and usability, and overdependence on technology, among others, are challenges associated with the utilization of AI tools for enhanced research among postgraduate students in universities in Benue State. The finding is feasible because the aforementioned challenges are common with the utilization of digital technologies. The finding agrees with Yadav et al. (2024), who revealed concerns about the reliability of AI systems and the potential for reduced human oversight. This presents a challenge associated with the utilization of AI-driven research tools, as revealed by the present study. The finding is also consistent with Kasumu and Agbarakwe (2024), who indicated that 60% of respondents declared that a lack of contextual awareness was a limitation placed on artificial intelligence systems in foreign language education. This represents another challenge, as revealed by the present study. Hence, in line with previous findings, the present study adds to the empirical literature that bias and fairness, data privacy and security concerns, complexity and usability, and leading to overdependence on technology, among others, are challenges associated with the utilization of AI tools for enhanced research among postgraduate students in universities in Benue State.

Furthermore, the study revealed that there are strategies to enhance the utilization of AI tools for enhanced research among postgraduate students in universities in Benue State. According to respondents, training students on how to control bias and fairness, obtaining an obtaining an institutional license for AI tools to ensure access, promoting peer learning and collaboration to ease usability, students avoiding overdependence on technology are the strategies to enhance the utilization of AI tools for enhanced research. The finding is feasible because bias and fairness, data privacy and security concerns, complexity and usability, and overdependence on technology, among other challenges, can be addressed by the aforementioned strategies. The finding agrees with Alordiah, Osagiede, Omumu, Okokoyo, Emiko-Agbajor, Chenube, and Oji (2023) suggested that stakeholders in research and education raise awareness of the availability of free online digital tools (FODT) and offer seminars on how to utilise them. This aligns with the strategies highlighted in the present study. The findings are in line with Bucea-Manea-oniș, Kuleto, Gudei, Lianu, Lianu, Ilić, and Păun (2022) regarding the training of students in the use of AI. They suggest that universities should develop new digital skills in artificial intelligence (AI), machine learning, Internet of Things (IoT), 5G, the cloud, big data, blockchain, data analysis, using Microsoft Office and other applications, MOOCs, simulation

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applications, VR/AR, and gamification. This could facilitate the utilization of AI for academic work, as revealed by the present study. Hence, in line with previous findings, the present study adds to the empirical literature that training students on how to control bias and fairness, obtaining an obtaining an institutional license for AI tools to ensure access, promoting peer learning and collaboration to ease usability, students avoiding overdependence on technology are the strategies to enhance the utilization of AI tools for enhanced research.

V. CONCLUSION

Drawing from the findings of the study, it was concluded that there is lack of awareness and utilization of AI tools among postgraduate students in universities in Benue State for enhanced research. The study also concluded that there are constraints impeding the utilization of AI tools for enhanced research, however, these challenges can be addressed if careful consideration is given to AI tools utilizations for enhanced research.

RECOMMENDATIONS

➢ *On the Basis of the Findings of the Study, the Following Recommendations were Made:*

- Faculties/Departmental heads should organize Seminars and workshops aim at intimating postgraduate students on the use of various AI tools for enhanced research.
- Postgraduate students should encourage collaboration in their research as a way of enhancing their awareness and utilization of AI tools for enhanced research.
- Institutional licenses for AI tools should be acquired by various Universities in order to ensure access by postgraduate students.

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