

Lecturers' Awareness of Artificial Intelligence Tools for Teaching and Research in Alvan Ikoku Federal University of Education, Nigeria

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Abstract

Technology integration into curriculum no doubt has so many benefits that lecturers in tertiary educational institutions can derive. This study examined lecturers' awareness of Artificial Intelligence (AI) tools for teaching and research at Alvan Ikoku Federal University of Education Owerri Nigeria. The AI tools examined in the study include: ChatGPT, PowerPoint Speaker Coach Quillbot, Perplexity, Scholarcy, Gradescope, Mendeley Gemini, MATHia, ChatPDF, Consensus, Research Rabbit, Class Point and Scite. Three research questions and two research hypotheses guided the study. The population of study comprised lecturers in the university. Data for the study was collected using researchers developed questionnaire tagged Lecturers' Awareness of Artificial Intelligence Tools for Teaching and Research Questionnaire (LAAITTRQ) on WhatsApp. Mean and standard deviation was used to answer research questions while independent samples t-test statistics and Analysis of Variance (ANOVA) test was employed to test the formulated hypotheses at a 0.05 level of significance. Findings reveal that lecturers are aware of AI tools for teaching and research. Furthermore, it was discovered that there was no significant difference in awareness according to gender. However, significant differences in awareness exist according to teaching experience with the least experienced lecturers having awareness mean scores higher than the most experienced and the moderately experienced. Based on the findings, the researchers recommended that workshops and training on the use of AI tools in teaching and research should be organized in the university to boost their knowledge and skills among others.

Keywords: AI in Education, Lecturers' Awareness, Teaching Technologies, Digital Literacy, Teaching and Research.

Introduction

Since the outbreak of the COVID-19 pandemic, the world has witnessed an unprecedented integration of information and communication technology in everyday life. The field of education has come to see ICT as an important input in the curriculum. Computers and their technologies have been shaping the emergence of newer technologies integrated into teaching and learning. With advancements in computer science, a branch of study called Artificial Intelligence (AI) has emerged with overbearing influence in our daily lives. According to Ukeh and Anih (2024), AI has emerged as a transformative force across various

sectors, offering innovative solutions to complex problems. Sharma (2024) defined AI as a multidisciplinary science with numerous approaches that operates based on the combination of enormous amounts of digital data and intelligent algorithms that let machines “learn” automatically by having the capacity to read and understand guidelines and data so that they analyse and act following logical reasoning and behave in a way that is comparable to humans. Furthermore, Kanade (2022) defined AI as the intelligence of a machine or computer that enables it to imitate or mimic human capabilities. According to Khan et al. cited in Opele, et al. (2024), Artificial Intelligence (AI) refers to a field of computer science that focuses on developing intelligent systems capable of simulating human-like cognitive abilities and performing tasks that typically require human intelligence. AI systems are designed to see and understand the world through various input modes, such as text, images, video, and audio (Luz et al., 2020). This involves techniques like computer vision, natural language processing, and speech recognition, which enable machines to interpret and process sensory data. It may seem that Artificial intelligence is a very recent technological development however its groundwork began in the early 1900s. The word Artificial Intelligence was first coined and used in 1955 by John McCarthy and has since been used to refer to machine learning.

Benefits of AI Tools in Education

There are many evolving AI tools for use in research by lecturers and students in higher education. Despite that there is a plethora of these AI tools for teaching and research, it may be possible that most lecturers in tertiary institutions of learning are not aware of them, what they can do in the learning environment, and how they can lead to increased output. Therefore, it is necessary that every lecturer learn about AI and how they can leverage this technology to benefit the learners and enhance their work (Poth, 2023). AI tools and websites can help teachers boost their productivity, personalize learning, and create lesson content. Similarly, Opele, et al. (2024) discovered that the integration of AI tools in education is beneficial as it enhances personalized learning, streamlines administrative tasks, improves research support, and facilitates collaboration.

These tools for research can help researchers to discover new sources for their literature review or research assignment. The tools are capable of being used to synthesize information from large databases of scholarly output with the aim of finding the most relevant articles and save researchers' time. As with our research databases or any other search tool (Georgetown University, 2024). When utilized effectively, AI can reduce the time spent locating materials, freeing up time for the researcher to focus on reading and research.

AI Awareness among Educators

With unprecedented technological advancements, Artificial Intelligence (AI) has necessitated a paradigm shift in the field of education (Karaca & Kılcan, 2023). The need for the integration of this novel area of study in teaching and learning in universities and other

tertiary institutions has been an issue of discourse in recent research works. As the learners have started using AI tools in doing assignments, the lecturers need to be aware of the tools in a bid to help students use them appropriately for learning. This is supported by Vinothkumar and Saratha (2024) who stated that AI can enhance the grading procedure, improve accessibility of learning materials, automate processes, and enable students have a personalized learning experience.

In line with the fore going, the use of these tools like other technologies in the classroom by the teacher depends on his awareness of their existence. According to Rahman and Kodikal (2023) awareness play significant role in influencing the adoption of AI within the higher education system. Onwuagboke (2023) was apprehensive that the integration of technologies in Nigerian tertiary institutions has progressed rather slowly probably as a result of mass unawareness of the existence of these technological tools. Specifically, awareness is the ability to directly know and perceive, to feel, or to be cognizant of events. It is a state where a person is aware of some information when that information is directly available to enable a wide range of behavioural actions ("Awareness," 2022). In terms of AI technology awareness, it has been stated that Asia and Africa are still lagging behind developed nations (Ahmad et al 2024).

There is empirical evidence that the majority of the university students in three universities in Kwara state are not aware of Artificial intelligence for learning (Alimi, et al., 2021). On the other hand, Nyaaba et al (2024) reported increasing awareness of Pre-service teachers in Ghana on AI tools for research like ChatGPT, Google Bard, and DALLE. Thomas (2022) reported that lecturers are aware of AI tools for teaching and learning at the Federal University of Technology Minna. In the same vein, scholars have found an increasing awareness of faculty on the use of AI in education (Ghimire, et al., 2024; Idhalama, et al., 2023). Apart from the awareness of the existence of the tool, it is also important for the lecturers to have pedagogical knowledge of how to integrate them in the learning environment for the benefit of the learners if the benefits of such tools in education are to be achieved. There are variables that can be responsible for differences in awareness of AI tools among lecturers.

Gender of the lecturers is one variable that can be responsible for difference in lecturers' awareness of AI technologies for learning. Vinothkumar and Saratha (2024) discovered no differences in awareness between male and female postgraduate students' awareness of AI tools for learning. Similarly, Thomas (2022) found that there was no difference in awareness of AI tools for teaching between male and female lecturers at the Federal University of Technology Minna. Khalid and Khan (2022) on the other hand, discovered a digital divide in technology use occasioned by the outbreak of the COVID-19 pandemic and maintained that the gap should be further investigated and bridged.

Apart from gender, teaching experience is another variable that may determine awareness of any innovative technology like AI tools in learning. The highly experienced and less experienced lecturers may belong on the two sides of the digital divide. The less experienced lecturers belong to the digital natives and as such are very much aware of the

emergence of new technologies and teaching tools. On the other hand, the more experienced lecturers belong to the digital migrants who were taught and trained without much technology hence they are less technology savvy. Baek, et al. (2008) reported that experienced teachers generally adopt technology involuntarily in response to external forces while teachers with little experience are more likely to use it on their own will. Conversely, Ononye, et al. (2024), stated that awareness of innovative teaching tools did not differ substantially among the lecturers; this makes it imperative to find the difference in awareness between the lecturers according to their teaching experience.

AI Tools used in Education

There are many AI tools used in the teaching and learning environment which include but not limited to the following:

ChatGPT: This is an AI chatbot that simulates human speech through natural language processing. The language model may write emails, articles, essays, code, social media postings, and other textual content in addition to responding to queries (Hetler, 2023).

Mendeley: This is an easy-to-use AI application that lets you correctly arrange, share, and cite all of your research articles in one location. It facilitates easier document annotation, improved bibliography creation, and PDF organization.

Consensus: Consensus is an AI-driven search engine that specializes in extracting and condensing scientific insights from peer-reviewed sources. The goal is to liberalize access to expert knowledge and make science more approachable.

Research Rabbit: Research Rabbit is a free online citation-based visual literature review mapping software tool which connects your research interests to related articles and authors.

QuillBot: This is an online AI writing platform with a number of tools which enables the user to rewrite, check grammar and plagiarism, as well as translate, outline and create citation thus making way for successful writing (Pfeifer, 2024).

Scholarcy: This is an online tool that employs AI technology to summarize long research articles, reports, and documents into easy-to-digest summaries.

Gradescope: This is AI grading software that lets students turn in assignments online in order to receive faster and more detailed feedback on their work. It gives lecturers comprehensive *analytics on assignment and question while keeping the original work and allow for quick and easy viewing from anywhere.*

ClassPoint: ClassPoint is a Classroom Response System that can be embedded in Microsoft PowerPoint allowing users to turn their existing slides into an interactive presentation and seamlessly deliver quiz questions within PowerPoint without the hassle of switching to another application during teaching (Bong & Chatterjee, 2021).

MATHia: This is online math learning programme that personalizes instruction for middle school and high school students tailored to their own learning style.

Scite: Scite AI is online tool that mainly focuses on evaluating the reliability of scientific claims. It enables researchers to analyse the citation context of a paper to determine if the citation supports or disputes the cited claim.

ChatPDF: This is an innovative AI-powered tool that transforms how we interact with PDF documents. The natural-language conversational interface lets users quickly ask questions and get precise answers from any PDF file.

Perplexity: Perplexity combines AI with web search to produce ready-made answers. It cites its sources, which are real but tend not to be scholarly. Again, it is possibly best suited to generating ideas and identifying sources than to any significant contribution to producing a review (Dressel, 2024).

Gemini: Google Gemini is an AI-powered chatbot tool designed by Google to simulate human conversations using natural language processing and machine learning. It aims to allow for more natural language queries, rather than keywords, for search (Wallace, 2024). The AI tools discussed are just a few of the many evolving tools for teaching and research that educators should be aware of.

Integration of AI tools in Teaching and Research

Most of these AI tools are free with some of the paid tools having a free version. Ortiz, (2023) discussed the various applications of AI in research, using ChatGPT as a good example as the tool has become popular among students and lecturers in recent time. Some researchers have stated that ChatGPT can be used in many ways to save time in research like in:

- Brainstorming;
- Generating an outline;
- Conducting literature review
- Getting access to sources;
- Asking for specific examples and
- Generating citations (Biswas, 2023; Ortiz, 2023).

Harouni cited in Ross (2023) identified four ways AI tools like ChatGPT can be used by a teacher in the classroom and advised that:

1. Teachers should have the awareness of their existence as the students are well aware that AI tools such as ChatGPT exist and are already experimenting with them on their own.
2. Teachers should use AI alongside their students. This can be done by engaging with generative AI tools with their students in person, when possible. Otherwise, they should share AI-generated responses to questions during class time and ask students to consider them. In the alternative, teachers should allow students to experiment with the AI tool at home, write down their experiences, and then share them with the class.

3. The teacher should be aware of the nature of the tool and as a result, teach students how to ask the ChatGPT tool questions.
4. The AI tools can be used to spark the imagination of the students.

Furthermore, teaching with AI tools will challenge educators to change their pedagogical approach from what it used to be when they taught without AI. Centre for Teaching and Learning (2023) advises teachers to integrate AI into learning by giving assignments that support students in developing linked thinking and writing by discussing, drafting, and revising ideas concerning sources and evidence. Puntillo (2024) enumerated AI tools that can be used in education including ChatGPT, Education Copilot, Gradescope, ClassPoint, Squirrel AI, and MATHia, etc. Furthermore, she stated that the tools can be used in these ways such as providing personalized feedback to students, automating administrative tasks, and even identifying areas where students may need extra help.

Given the plethora of emerging AI technologies and their benefits in education, the researchers observed that many of the lecturers in the university do not use them in their teaching and research. This may be as a result of insufficient awareness of these tools among lecturers in the university. This is more so as lecturers cannot use tools they are not sufficiently aware of their existence and their usefulness in their teaching and research works. This study was therefore designed to bring to light the importance of awareness of these technologies in their adoption and integration in education.

Purpose of the Study

The objectives of the study were to:

- i. Ascertain the awareness of lecturers in the university of AI tools for teaching and research.
- ii. Find out the difference in awareness of AI tools for teaching and research between male and female lecturers in the university.
- iii. Find out the difference in awareness of AI tools for teaching and research among lecturers in the university according to their level of teaching experience.

Research Questions

- i. What are the AI tools for teaching and research that lecturers of Alvan Ikoku Federal University of Education are aware of?
- ii. What is the difference in AI tools for teaching and research awareness mean score between Male and female lecturers of Alvan Ikoku Federal University of Education?
- iii. What are the differences in AI tools for teaching and research awareness mean score between the least experienced, moderately experienced, and the most experienced lecturers in Alvan Ikoku University of Education Owerri?

Research Hypotheses

- i. There is no significant difference in AI tools for teaching and research awareness mean score between male and female lecturers in Alvan Ikoku Federal University of Education Owerri
- ii. There is no significant difference in AI tools for teaching and research awareness mean score between least experienced, moderately experienced and most experienced lecturers in Alvan Ikoku Federal University of Education Owerri.

Methods

This study conducted at the Alvan Ikoku Federal University of Education Owerri adopted a descriptive survey research design. The study's population consisted of 750 lecturers at the University from 6 Faculties. A sample size of 261 respondents was randomly selected from the population using stratified random sampling technique. The research instrument was a 16-item questionnaire centred on awareness of the listed AI tools for teaching and research. The instrument was validated by three experts from the Educational Technology Department at the Alvan Ikoku Federal University of Education, Nigeria. Their comment and suggestions led to the modification of the items in the questionnaires. All the items in the questionnaire were judged to be relevant to what is being measured thereby ensuring adequate content and face validity of the instrument. A pilot study was done at a specific university in Imo State of Nigeria to ascertain the reliability of the research instrument. The research instrument was reliable at 0.87 for items on Awareness of Artificial Intelligence tools for learning and research at 0.05 level of significance, using Cronbach's Alpha model. The research instrument was administered to the sample using WhatsApp. Out of the 261 questionnaires distributed, only 238 were duly filled and returned giving a return rate of 91.2%. Data collected from the survey were analysed using SPSS software version 23. The research questions were answered using mean and standard deviation scores. The decision rule was that mean scores 2.5 and above are accepted significant awareness while mean scores below 2.5 were rejected. In testing the hypotheses, two tests were used; Independent t-test statistic was used to test the null hypothesis one at 0.05 level of significance, while null hypothesis two was tested using Analysis of Variance (ANOVA) test at 0.05 level of significance. Independent samples t-test was used to compare mean scores of male and female lecturers as it is best suited for such comparison. ANOVA test was used to compare the mean scores of the lecturers according to teaching experience which exist in three categories as it is best suited for it. The basic assumptions of normality and homogeneity of variance required for both tests were checked and none of them was violated. The null hypotheses were rejected when the calculated sig. value was less than 0.05; on the other hand, the researchers fail to reject the null hypotheses when the sig. value was more than 0.05.

Findings

Research Question 1

What are the AI tools for teaching and research that lecturers of Alvan Ikoku Federal University of Education are aware of?

Table 1: Lecturers' mean score on their awareness of AI tools for teaching and research

S/n	Item	N	Mean	SD	Decision
1	I am aware of Gradescope as AI teaching tool	238	2.28	.89	Rejected
2	I know PowerPoint Speaker Coach as AI teaching tool	238	2.75	.67	Accepted
3	I am knowledgeable of ClassPoint as AI teaching tool	238	2.61	.84	Accepted
4	I know MATHia as AI teaching tool	238	2.23	.82	Rejected
5	I am knowledgeable of AudioPen as AI teaching tool	238	2.28	.84	Rejected
6	I know Eduaide as AI teaching tool	238	2.33	.82	Rejected
7	I am aware of ChatGPT as AI research tool	238	3.23	.66	Accepted
8	I am aware of Medley as AI research tool	238	2.89	.69	Accepted
9	I am aware of Consensus as AI research tool	238	2.29	.82	Rejected
10	I am aware of Research Rabbit as AI research tool	238	2.41	.83	Rejected
11	I am aware of QuillBot as AI research tool	238	2.36	.85	Rejected
12	I am aware of Scholarcy as AI research tool	238	2.24	.80	Rejected
13	I am aware of Scite as AI research tool	238	2.20	.74	Rejected
14	I am aware of ChatPDF as AI research tool	238	2.72	.70	Accepted
15	I am aware of Perplexity as AI research tool	238	2.63	.76	Accepted
16	I am aware of Gemini as AI research tool	238	2.91	.67	Accepted
	Cumulative Mean		2.52		Accepted

Data presented in Table 1 show that only seven items out of the sixteen items received mean scores above 2.5 while nine items received mean scores below 2.5. The sixteen items received a cumulative mean score of 2.52 which is slightly above the benchmark of 2.5, therefore, it was concluded that the lecturers were aware of AI tools for teaching and research. Although it has been concluded that the lecturers are aware of AI tools for teaching and research based on the cumulative mean ($M = 2.52$), a closer look at the number of AI tools that lecturers' responses show awareness (7) of and the ones that their responses show lack of awareness (9), it may be said that there is insufficient awareness of most of the AI tools listed.

Research Question 2

What is the difference in AI tools awareness mean score between Male and female lecturers of Alvan Ikoku Federal University of Education?

Table 2: Difference in Awareness of AI tools mean score for teaching and research of male and female lecturers

Awareness of AI tools for Teaching and Research	N	Mean	SD	Mean Diff
Male	73	43.44	9.07	
				.17
Female	165	43.27	8.73	

Table 2 show that the awareness of AI tool for teaching and research mean score of male lecturers is (M = 43.44, SD = 9.03) and that of the female lecturers is (M = 43.27, SD = 8.73). Though there is difference in mean of the two groups, the difference is .17 which is rather very slight.

Research Question 3

What is the difference in AI tools awareness mean scores between least experienced, moderately experienced and most experienced lecturers in Alvan Ikoku Federal University of Education Owerri?

Table 3: Tukey HSD multiple comparison of mean for the three groups of lecturers according to length of teaching experience

(I) Teaching Experience	(J) Teaching Experience	Mean Difference (I-J)	Std. Error	Sig.
Least Experienced	Moderately Experienced	5.52 [*]	2.21618	.014
	Most Experienced	5.22 [*]	2.36603	.030
Moderately Experienced	Least Experienced	-5.52 [*]	2.21618	.014
	Most Experienced	-.31	1.93812	.875
Most Experienced	Least Experienced	-5.22 [*]	2.36603	.030
	Moderately Experienced	.31	1.93812	.875

Data presented in Table 3 show that there were differences in mean score between the least experienced and the moderately experienced lecturers was (I-J = 5.52); the difference in mean score between least experienced and most experienced lecturers was (I-J = 5.22) while the difference in mean score between the most experienced and the moderately experienced was (I-J = .31). Post-hoc comparisons using the Tukey HSD test indicated that the mean score for least experienced lecturers (M = 48.32, SD = 11.44) was significantly different from that of the moderately experienced lecturers and most experienced lecturers. The moderately experienced lecturers (M = 42.80, SD = 9.55) did not differ significantly from the most experienced lecturers (M = 43.10, SD = 6.65) in their mean scores.

Hypothesis 1

There is no significant difference in AI tools for teaching and research awareness mean score between male and female lecturers in Alvan Ikoku Federal University of Education Owerri.

Table 4: Summary of t-test of significant mean difference on awareness based on gender

Awareness of AI tools for Teaching and Research	N	Mean	SD	T	Df	p-value	Decision
Male	73	43.44	9.07	.098	236	.922	Not Significant
Female	165	43.27	8.73				

Data presented in Table 5 show that there was no significant difference in mean scores on awareness of AI tools for teaching and research for male lecturers ($M = 43.44$, $SD = 9.07$) and female lecturers ($M = 43.27$, $SD = 8.73$; $t(236) = .098$, $p = .922$ two-tailed). The inference was based on the p-value of .922 which is more than the significant level of .05. Therefore, the researchers fail to reject the null hypothesis.

Hypothesis 2

There is no significant difference in AI tools for teaching and research awareness mean score between least experienced, moderately experienced and most experienced lecturers in Alvan Ikoku Federal University of Education Owerri.

Table 5: Analysis of Variance (ANOVA) showing lecturers awareness mean scores based on their teaching experience

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Decision
Corrected Model	575.639 ^a	2	287.819	3.410	.036	
Intercept	213218.123	1	213218.123	2525.808	.000	
Teaching Experience	575.639	2	287.819	3.410	.036	Significant
Error	9707.819	235	84.416			
Total	239436.000	238				
Corrected Total	10283.458	236				
a. R Squared = .056 (Adjusted R Squared = .040)						

Data presented in Table 5 indicate that there was a significant difference in the mean scores of the lecturers as a result of teaching experience at $p = 0.05$ level for the three levels of teaching experience: $F(2, 235) = 3.41$, $p = 0.036$. Based on the p-value of the test which was .036 and below the significant level of .05, the researchers therefore rejected the null hypothesis. It was therefore concluded that there was a significant difference in lecturers' awareness of AI tools for teaching and research based on their teaching experience.

Discussion

The findings of the study have revealed that the lecturers in AIFUE Owerri who participated in the survey were not aware of a majority of the AI tools that can be used in teaching. They showed reasonable awareness of seven AI tools namely ChatGPT, PowerPoint Speaker Coach, ClassPoint, ChatPDF, Medley, Perplexity and Gemini. On the average, a cursory look at the cumulative mean score of the lecturers on the items show that it was slightly above the 2.5 benchmark leading the researchers to conclude that the lecturers were aware of AI tools for teaching and research. However, a closer look at the details indicates that the lecturers are only aware of 7 AI tools out of the 16 listed for the study. The implication of this is that the lecturers may be moderately aware of the AI tools that are being developed rapidly. Being aware of a particular set of tools may not be enough hence lecturers should keep track with AI technological developments if they must reap their numerous benefits in education. This result is in tandem with the findings of Thomas (2022), Idhalama, et al. (2023), Nyaaba et al (2024), and Ghimire, et al. (2024) that reported increasing awareness of lecturers of AI tools for teaching and learning. It is also at variance with Madu and Musa (2024) that also reported moderate awareness of these tools on the part of university lecturers. The lack of awareness of a majority of the AI tools for teaching may be a result of the fact that these tools are fast evolving at a speed that lecturers are yet to be abreast with. It has also been revealed by the findings of this study that there is no difference in awareness of AI tools for teaching and research between male and female lecturers who participated in the study. This result aligns with Vinothkumar and Saratha (2024) discovery of no differences in awareness between male and female postgraduate students' awareness of AI tools for learning. It is also in tandem with Thomas (2022) report of no difference in awareness of AI tools for teaching between male and female lecturers at the Federal University of Technology Minna. The implication of this for training of educators on the use of AI tools is that university administration should ensure gender equity in selection of staff for regular pedagogical training on the use of AI in teaching and research.

Furthermore, there were differences in awareness of lecturers of AI tools for teaching and research based on their years of teaching experience with the least experienced lecturers having higher level of awareness than the other two groups. This finding aligns with Baek, et. al. (2008) that reported that teachers with little experience are more likely to use technology on their own will than the more experienced ones. The result is at variance with Ononye, et. al. (2024) who stated that awareness of innovative teaching tools did not differ substantially among the lecturers. With lower awareness level among highly experienced and moderately experienced lecturers, the university administration should consider these two categories more when selecting staff to benefit from workshops on AI awareness so that no lecturer will be left behind in the integration of AI in teaching and research in the university.

Conclusion

In conclusion it is evident from the study that lecturers at Alvan Ikoku Federal University of Education Owerri are aware of some AI teaching and research tools with no significant difference between male and female lecturers. There are differences in awareness of these tools as a result of the number of years of teaching experience of the lecturers. The least experienced lecturers have a higher level of awareness compared to their moderately experienced counterparts and the most experienced ones. There was no significant difference between the moderately experienced and the most experienced ones. The importance of integration of AI into teaching and research is numerous and the lecturers at Alvan Ikoku Federal University of Education cannot lag behind as a result of lack of awareness of relevant tools.

Recommendations

Based on the findings of the study, the researchers made the following recommendations.

1. University authorities should as a matter of necessity mount mandatory awareness workshops and trainings for faculty members on emerging AI technologies to enable them to be well informed about how to integrate them into teaching and research.
2. Ethical consideration should be addressed by the university establishing guideline to be followed in the integration of AI in curriculum thereby promoting transparency and fairness in AI-enabled assessment practices.

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