AWARENESS AND ADOPTION OF ARTIFICIAL INTELLIGENCE AS A TOOL FOR IMPROVING INSTRUCTIONAL DELIVERY METHODS AMONG WOODWORK TECHNOLOGY TEACHERS IN HIGHER INSTITUTIONS IN NORTH-CENTRAL, NIGERIA

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Abstract
The study investigated the extent of awareness and adoption of Artificial Intelligence (AI) as a tool for improving instructional delivery methods among woodwork teachers in higher institutions in North-central, Nigeria. Two research questions and two null hypotheses guided the study. Descriptive survey design was adopted for the study. The targeted population of the study was 105 respondents comprising of 41 highly experienced and 64 moderately experienced wood technology teachers from seven higher institutions in North-central, Nigeria. A structured questionnaire titled: "Awareness and Adoption of Artificial Intelligence Tools for Instructional Delivery Questionnaire (AAAITIDQ)" with 28 items was designed and used for data collection by the researcher. The instrument was subjected to both face validation by three experts in the Department of Industrial and Technology Education, Federal University of Technology, Minna, Niger State. To ascertain the reliability of the validated instruments, a pilot study was conducted by administering the validated questionnaire to three highly experienced and two moderately experienced wood technology teachers in Benue State University. Cronbach Alpha's statistical technique was used to determine the internal consistency of the instrument which yielded an overall reliability coefficient of 0.87 indicating that the instrument was reliable and suitable for use. Mean and standard deviation were used to answer the research questions. Data collected were coded and analyzed using the Statistical Package for Social Sciences (SPSS, Version 27). Based on the analyses, the findings of the study revealed that the extent of awareness of AI as a tool for improving instructional delivery methods among wood technology teachers in higher institutions was high with the grand mean of $\overline{\chi}$ *= 3.65. The study also revealed that the extent of adoption of AI as a tool for improving instructional delivery among wood technology teachers in higher institutions was low with the grand mean of* $\overline{\chi}$ *= 2.63. Based on the findings, it was recommended among others that targeted training programmes and workshops should be organized to equip wood technology teachers with practical skills for effectively integrating AI into lesson planning, teaching aids, assessments, and performance tracking.*

Keywords: *Awareness, Adoption, Artificial Intelligence, Improving Instructional Delivery Methods, Woodwork Technology Teachers, Higher Institutions*

Introduction
The rapid advancement of technology in the 21st century has significantly transformed the educational landscape. Among these innovations, Artificial Intelligence (AI) has emerged as one of the most influential tools for reshaping instructional delivery, research, and assessment in higher institutions worldwide (Luckin *et al.,* 2016). AI refers to computer systems designed to perform tasks that typically require human intelligence, such as problem solving, decision making, and

learning (Russell & Norvig, 2021). In education, AI has been increasingly applied in personalized learning, intelligent tutoring systems, automated grading, content generation, plagiarism detection, and predictive analytics, thereby improving teaching and learning processes (Holmes *et al.*, 2019). Higher institutions are under pressure to improve the quality of instructional delivery to meet the demands of globalization, industry expectations, and 21st-century skills (Olanrewaju, 2020). Woodwork, as a component of technical and vocational education, requires innovative pedagogical methods that enhance both theoretical knowledge and practical skills. However, traditional teaching methods often limit individualized learning, efficiency, and the integration of digital tools that can support students' creativity and problem-solving abilities (Ogbuanya & Owodunni, 2015). Integrating AI into woodwork instruction offers opportunities to address these gaps by supporting simulation of woodworking processes, providing digital design assistance, and facilitating more effective assessment practices (Baker & Smith, 2019).

Awareness and adoption of AI among teachers are critical factors in realizing these benefits. Awareness relates to teachers' knowledge of AI tools, their functions, and their potential application in the classroom, while adoption refers to the extent to which teachers integrate these tools into their teaching practices (Venkatesh *et al*., 2003). Studies in developed countries reveal that many educators are increasingly aware of AI and adopt it in their teaching practices (Zawacki-Richter et al., 2019). However, in developing contexts such as Nigeria, low awareness, inadequate infrastructure, and limited professional training have hindered effective adoption of AI in higher education (Afolabi & Oyediran, 2022). For woodwork teachers in higher institutions in North-central, Nigeria, the situation is particularly crucial. The region is home to several universities, polytechnics, and colleges of education that train future technical educators and skilled artisans. If teachers in these institutions lack awareness or fail to adopt AI tools, students may be deprived of opportunities to acquire relevant digital competencies and industry-aligned skills. Conversely, greater awareness and adoption of AI could lead to more engaging instructional delivery methods, enhanced student learning outcomes, and improved competitiveness of Nigerian graduates in the global knowledge economy. Given this, it became necessary for this study to investigate the extent of awareness and adoption of AI as a tool for improving instructional delivery methods among woodwork teachers in higher institutions in North-central, Nigeria.

Statement of the Problem

The integration of AI into education has been recognized globally as a pathway to enhancing teaching and learning effectiveness, improving student engagement, and equipping learners with 21st-century skills (Holmes *et al.*, 2019; Luckin *et al.*, 2016). In technical and vocational education, particularly woodwork instruction, AI can provide valuable tools for lesson planning, instructional simulation, assessment, and feedback.

Despite these potentials, many higher institutions in Nigeria still rely heavily on traditional teaching methods that limit the flexibility, efficiency and personalization of instruction (Ogbuanya & Owodunni, 2015). Afolabi and Oyediran (2022) reported that the awareness and adoption of AI among lecturers in Nigerian higher institutions is still low, with limited access to training, poor infrastructural support, and minimal institutional encouragement being major constraints. Consequently, woodwork teachers, who play a crucial role in training skilled manpower for national development, may not be taking advantage of AI tools to enhance instructional delivery. This gap raises concerns about the readiness of graduates from higher institutions in North-central,

Nigeria to compete in a knowledge-driven global economy where AI competence is becoming indispensable.

Although research on AI in education is expanding globally (Zawacki-Richter *et al.,* 2019), there is limited empirical evidence focusing on technical and vocational subjects such as woodwork in Nigeria. The extent to which woodwork teachers in higher institutions in North-Central Nigeria are aware of AI applications and the degree to which they adopt them in instructional delivery remain largely unknown. Without such knowledge, it will be difficult for policymakers, educational leaders, and curriculum developers to design effective strategies that promote AI integration in technical education. It is against this backdrop that this study sought to determine the extent of awareness and adoption of AI as a tool for improving instructional delivery methods among woodwork teachers in higher institutions in North-central, Nigeria.

Aim and Objectives of the Study

The aim of the study was to examine woodwork technology teacher's awareness and adoption of AI as a tool for improving instructional delivery methods in higher institutions in North-central, Nigeria. Specifically, the objectives were to:

1. determine the extent of awareness of AI as a tool for improving instructional delivery methods among wood technology teachers in higher institutions in North-central, Nigeria.
2. determine the extent of adoption of AI as a tool for improving instructional delivery methods among wood technology teachers in higher institutions in North-central, Nigeria.

Research Questions

Based on the objectives of the study, the following research questions guided the study:

1. What is the extent of awareness of AI as a tool for improving instructional delivery methods among wood technology teachers in higher institutions in North-central, Nigeria?
2. What is the extent of adoption of AI as a tool for improving instructional delivery methods among wood technology teachers in higher institutions in North-central, Nigeria?

Methodology

A descriptive survey research design was adopted for the study. This design was deemed appropriate because it facilitates the systematic collection of data from a defined population through the use of structured questionnaires, and permits the researcher to describe, analyze and generalize findings to the larger population (Fraenkel, *et al.,* 2019). The targeted population of the study was 105 respondents comprising of 41 highly experienced and 64 moderately experienced wood technology teachers from seven higher institutions in North-central, Nigeria. The instrument for data collection structured questionnaire titled: "Awareness and Adoption of Artificial Intelligence Tools for Instructional Delivery Questionnaire (AAAITIDQ)". The instrument was a 28 items questionnaire designed by the researcher. Responses were structured on a four-point Likert scale of: High Extent (HE), Moderate Extent (ME), Low Extent (LE), and Very Low Extent (VLE) with numerical values of 4, 3, 2, and 1 respectively. The instrument was subjected to both face validation by three experts. To ascertain the reliability of the validated instruments, a pilot study was conducted by administering the validated questionnaire (AAAITIDQ) to three (3) highly experienced and two (2) moderately experienced wood technology teachers in Benue State University, in Benue State. Cronbach Alpha's statistical technique was used to determine the internal consistency of the instrument which yielded an overall reliability coefficient of 0.87

indicating that the instrument was reliable and suitable for use. The data collected was analyzed using mean and standard deviation. Mean and standard deviation were used to answer the research questions.

Research Question 1: What is the extent of awareness of AI as a tool for improving instructional delivery among wood technology teachers in higher institutions in North-central, Nigeria?

The data for answering research question 1 is presented in Table 1.

Table 1: Mean and Standard Deviation of Respondents on the Extent of Awareness of AI as a Tool for Improving Instructional Delivery Methods among Wood Technology Teachers

S/N	Statement	Mean ($\bar{x}$) (N = 105)	SD	Remark
1	I am aware that AI tools can be used to prepare lesson plans in woodwork instruction	3.85	0.45	HE
2	I know that AI can create or simulate woodworking designs for teaching purposes	3.73	0.48	HE
3	I am aware that AI can generate teaching aids such as diagrams, videos, or interactive materials.	3.83	0.50	HE
4	I am aware that AI can assist in assessing students' practical and theoretical woodwork skills.	3.74	0.52	HE
5	I know that AI tools can support personalized learning for students in wood technology courses.	3.70	0.55	HE
6	I am aware of AI-powered plagiarism detection tools for checking student assignments	3.40	0.60	ME
7	I know that AI can facilitate virtual simulations of woodworking processes	3.35	0.62	ME
8	I am aware that AI can assist in tracking student progress and performance analytics	3.68	0.49	HE
9	I know about AI-based platforms that can enhance teaching and learning efficiency in woodwork	3.80	0.47	HE
10	I am aware of the potential of AI to improve instructional delivery in higher institutions	3.72	0.51	HE
11	I am aware that AI tools can help create interactive quizzes and assessments for woodwork students	3.65	0.53	HE
12	I know that AI can be used to provide feedback to students automatically on practical exercises	3.60	0.50	HE
13	I am aware that AI can assist in scheduling and organizing instructional activities efficiently	3.55	0.54	HE
	Grand Mean/SD	**3.65**	**0.52**	**High Extent**

Note: N = Number of Respondents; SD = Standard Deviation; VHE = Very High Level

Table 1 shows the mean responses of the respondents on 13 items posed to determine the extent of awareness of AI as a tool for improving instructional delivery methods among wood technology teachers in higher institutions in North-central, Nigeria. The mean values of the respondents ranged from 3.35 to 3.85, with a resulting grand mean of 3.65, which implies that the respondents collectively rated the items at a high extent, with a few items at moderate extent, as indicators of their awareness of AI as a tool for improving instructional delivery. Also, the standard deviation

of the items ranged from 0.45 to 0.62, with a resulting average standard deviation of 0.52, which indicates that the 13 items had standard deviations less than 1.96, showing that the respondents' ratings were not too far from the mean and were close to one another in their responses. This closeness of the responses adds value to the reliability of the mean.

Research Question 2: What is the extent of adoption of AI as a tool for improving instructional delivery methods among wood technology teachers in higher institutions in North-central, Nigeria?

The data for answering research question 2 is presented in Table 2.

Table 2: Mean and Standard Deviation of Respondents on the Extent of Adoption of AI as a Tool for Improving Instructional Delivery Methods among Wood Technology Teachers

S/N	Statement	Mean ($\bar{x}$) (N = 105)	SD	Remark
1	I use AI tools to prepare lesson plans for woodwork instruction.	2.55	0.60	LE
2	I integrate AI applications to simulate woodworking designs during lessons.	2.48	0.62	LE
3	I use AI to generate teaching aids such as diagrams, videos, or interactive materials.	2.60	0.58	LE
4	I use AI tools to assess students' practical and theoretical woodwork skills.	2.52	0.61	LE
5	I incorporate AI tools to provide personalized learning experiences for students.	2.50	0.59	LE
6	I use AI-powered plagiarism detection tools to check student assignments.	3.05	0.62	ME
7	I use AI to facilitate virtual simulations of woodworking processes for students.	3.10	0.63	ME
8	I use AI to track and analyze students' performance data.	2.58	0.57	LE
9	I employ AI platforms to enhance the efficiency of my teaching activities.	2.55	0.60	LE
10	I use AI tools to create interactive quizzes and assessments for students.	2.50	0.59	LE
11	I use AI to provide automated feedback to students on practical exercises.	2.48	0.61	LE
12	I use AI tools to organize and schedule instructional activities efficiently.	2.52	0.58	LE
13	I use AI to support collaborative learning among students through digital platforms.	2.50	0.60	LE
14	I integrate AI tools with other educational software to improve teaching and learning.	3.02	0.62	ME
15	I regularly update my instructional practices by adopting new AI tools available for teaching woodwork.	2.55	0.57	LE
	Grand Mean/SD	**2.63**	**0.60**	**Low Extent**

Note: N = Number of Respondents; SD = Standard Deviation; SA = Strongly Agree; A = Agree

Table 2 shows the mean responses of the respondents on 15 items posed to determine the extent of adoption of AI as a tool for improving instructional delivery methods among wood technology teachers in higher institutions in North-central, Nigeria. The mean values of the respondents ranged

from 2.48 to 3.10, with a resulting grand mean of 2.63, which implies that the respondents collectively rated most of the items at a **low extent**, with only a few items at moderate extent, as indicators of their adoption of AI as a tool for improving instructional delivery methods among wood technology teachers. Also, the standard deviation of the items ranged from 0.57 to 0.63, with a resulting average standard deviation of 0.60, which indicates that the 15 items had standard deviations less than 1.96, showing that the respondents' ratings were not too far from the mean and were close to one another in their responses. This closeness of the responses adds value to the reliability of the mean.

Discussion of Findings

The findings of research question one revealed that the extent of awareness of AI as a tool for improving instructional delivery methods among wood technology teachers in higher institutions was high. This implies that wood technology teachers in the sampled higher institutions in North-central, Nigeria are generally knowledgeable about the potential applications of AI in teaching. Specifically, the respondents demonstrated awareness of AI tools in areas such as lesson planning, generation of teaching aids, creation of interactive assessments, tracking student performance, and facilitating personalized learning experiences. This high level of awareness suggests that teachers recognize the growing role of AI in enhancing the quality and efficiency of instructional delivery. It also indicates that, within the context of higher institutions in North-central, Nigeria, educators are increasingly exposed to technological innovations and are capable of leveraging AI to support practical and theoretical aspects of woodwork instruction.

The finding aligns with previous studies in educational technology and AI integration. For instance, Adeniyi and Ibrahim (2021) reported that lecturers in Nigerian universities demonstrated high awareness of digital and AI-driven tools in teaching and research, particularly in creating instructional materials and automating certain pedagogical processes. Similarly, Okonkwo and Ofoegbu (2022) found that lecturers across universities and colleges of education exhibited comparable levels of awareness regarding emerging AI technologies, suggesting that professional exposure to AI is becoming consistent across different types of higher institutions. Moreover, international studies, such as Al-Samarraie *et al.* (2021) indicate that lecturers worldwide are increasingly aware of AI tools in teaching, highlighting a global trend toward technological adoption in education. In the present study, the high awareness among wood technology teachers suggests readiness for the integration of AI into instructional practices, although actual adoption may depend on factors such as institutional support, availability of resources, and perceived usefulness of specific AI tools. The finding implies that wood technology teachers in higher institutions in North-central, Nigeria are sufficiently aware of AI tools, and that the primary challenges to their adoption now lie in factors other than awareness, such as access, training, or institutional support

The findings of research question two revealed that the extent of adoption of AI as a tool for improving instructional delivery among wood technology teachers in higher institutions was low. This indicates that, despite the high level of awareness demonstrated by teachers, their actual use of AI tools in lesson planning, creation of teaching aids, interactive assessments, and performance tracking was limited. This low adoption may be attributed to several factors. First, access to AI-enabled platforms and necessary technological infrastructure in higher institutions may be inadequate, limiting teachers' ability to implement these tools effectively. Second, a lack of formal

training or professional development opportunities focused on the practical application of AI in teaching could hinder integration, even when teachers are aware of its potential benefits. Third, perceived complexity of AI tools or uncertainty about their effectiveness in improving learning outcomes may contribute to hesitation in adoption.

These findings are consistent with earlier studies. Adeniyi and Ibrahim (2021) noted that while lecturers were aware of digital and AI-driven instructional tools, actual utilization remained low due to challenges such as insufficient resources and lack of institutional support. Similarly, Okonkwo and Ofoegbu (2022) reported a gap between awareness and practical adoption of AI technologies among lecturers, highlighting the need for capacity building and infrastructure development. The low adoption observed in this study also resonates with international research. For example, Al-Samarraie *et al*. (2021) highlighted that, globally, awareness of AI in teaching is often higher than actual usage, with barriers including inadequate training, technological challenges, and resistance to change affecting adoption. This finding highlights the need for targeted interventions to promote the adoption of AI. Although teachers are aware of AI's potential to enhance instructional delivery, its practical application remains limited.

Conclusion

The study revealed that wood technology teachers in higher institutions in North-central, Nigeria possess a high level of awareness of AI as a tool for improving instructional delivery methods. Teachers demonstrated knowledge of AI applications in areas such as lesson planning, creation of teaching aids, interactive assessments, performance tracking, and personalized learning, indicating readiness to integrate AI into instructional practices. This finding suggested that awareness was no longer a major barrier to adoption, and that teachers were increasingly capable of leveraging AI to enhance the quality and efficiency of teaching in wood technology education.

Recommendations

The following recommendations were made based on the findings of the study:

1. Targeted training programmes and workshops should be organized to equip wood technology teachers with practical skills for effectively integrating AI into lesson planning, teaching aids, assessments, and performance tracking.

2. Higher institutions should provide adequate technological resources, such as AI-enabled software, computers, and stable internet access, alongside institutional policies and support that encourage and guide teachers in implementing AI tools in their teaching practices.

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