ASSESSMENT OF TECHNICAL COLLEGES TEACHERS ON THE AWARENESS OF ARTIFICIAL INTELLIGENT (AI) FOR ADVANCING TEACHING AND LEARNING IN KWARA STATE, NIGERIA

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Abstract
Study examined the awareness of technical college teachers on the application of Artificial Intelligent for advancing teaching and learning in Kwara State, Nigeria. The study consists of two objectives and two research questions. Survey research design was adopted for the study. The study is carried out in technical colleges in Kwara State. The targeted population for the study consists of 50 electrical and electronic trade and woodwork trade teachers in technical colleges in Kwara State. Simple random sample was used to select electrical and electronic trade and woodwork trade teachers in technical colleges in Kwara State. Mean and standard deviation was used to answer the research question. SPSS version 27 was used to analyze the result. The finding of the study revealed among others that technical college teachers are aware of some of the AI tools for teaching and learning. It is then recommended among others that there should be workshops or seminars organized by the government through the Ministry of Education to create awareness for the teachers.
Key words: Artificial Intelligence, tools, Technical College.

Introduction

The rapid advancement of technology is transforming every sector of human activity across all levels. Education is no exception teaching and learning processes are evolving to align with the demands of a dynamic, globalized world. This shift equips graduates at all educational levels with the skills and competencies needed to remain competitive, relevant, and valuable to themselves, their communities, and the broader global society. To maximize the benefits of technological integration in schools, it is essential that these tools and approaches support student-centered teaching methods, fostering active engagement and personalized learning experiences. The student-centered method of teaching is an instructional approach in which both teachers and students actively participate in the learning process. Rather than being passive recipients, students engage collaboratively with their peers and instructors in classroom activities. Research by Doyle and Zakrajsek

(2023) and Sealfon (2012) highlights that student-centered teaching fosters independence, enabling learners to construct knowledge on their own while promoting teamwork and shared learning experiences. Kerimbayev et al. (2023) further emphasize that this approach prioritizes the needs, interests, and perspectives of students, placing them at the heart of the educational experience.

Various perspectives affirm the value of student-centered teaching, describing it as a learner-friendly approach that empowers students to take an active role in their education. This method transforms the classroom into a collaborative space where both teachers and students engage meaningfully in academic activities. It promotes self-directed learning, making education more personal and relevant to each learner. The teacher's role shifts from being a sole source of knowledge to a facilitator who guides and supports students' learning journeys. Key advantages of the student-centered approach include Encouraging real-world engagement and experiential learning; Fostering critical thinking and problem-solving skills; Building teamwork and effective communication; Making learning more practical, interactive, and engaging and Supporting skill development through hands-on activities. Importantly, this approach also embraces the integration of Artificial Intelligence (AI) in teaching and learning, especially within technical colleges, enhancing instructional delivery and preparing students for the demands of a technologically driven world. Artificial Intelligence (AI) refers to software-based systems designed to perform tasks and make decisions without direct human intervention. When provided with accurate and relevant data, AI can execute a wide range of human-like activities often with greater speed and precision. These capabilities include teaching, learning, reasoning, thinking, and problem-solving. According to Parthiban and Ganesh (2024), AI encompasses a suite of technologies that enable machines to carry out functions traditionally requiring human intelligence. These include learning from data, understanding natural language, recognizing patterns, and making informed decisions. Such features make AI particularly effective in educational settings, where it supports both teachers and students. Furthermore, studies by Parthiban & Ganesh (2024), Al-Darayseh (2023), Karen et al. (2025), and Magdeline et al. (2024) highlight AI's potential to enhance teaching effectiveness, foster student engagement, promote accessibility and inclusivity, and support continuous learning and innovation. It also enables the adoption of advanced instructional methods and helps prepare learners for future challenges. AI tools have been developed for diverse applications across multiple sectors, including education, where they play a vital role in transforming teaching and learning experiences.

Artificial Intelligence (AI) is revolutionizing the education system by transforming academic processes across all levels including teaching, learning, research, assessment, administration, and evaluation. AI enables personalized learning experiences by adapting to each student's pace, strengths, weaknesses, and

background. For teachers, it expands their knowledge base and instructional capabilities, allowing them to connect with global resources beyond their immediate environment. AI supports teachers in designing lesson plans, generating quizzes, and simplifying complex materials for better understanding. It also enhances accessibility and inclusivity, ensuring that both teachers and students benefit from equitable learning opportunities. Moreover, AI contributes to curriculum development by aligning educational content with students' needs and evolving industry demands, recommending relevant skills and subjects. Numerous AI tools are available to support both theoretical and practical aspects of education. These include generative AI platforms, ClickUp, CartBots, Grammarly, and many others, each offering unique functionalities to enrich the teaching and learning experience (Okafor & Anyanwu, 2025; Thomas & Gambari, 2021). In technical colleges, where education emphasizes hands-on learning and real-world application, the integration of Artificial Intelligence (AI) proves highly effective. AI enables the customization of instructional content to align with practical skills and performance-based outcomes. Through simulation of real-world scenarios, students can engage in technical tasks within safe, controlled virtual environments enhancing experiential learning without physical risk. Moreover, AI empowers stakeholders in technical education by providing access to a vast array of global resources, including instructional materials, datasets, and expert knowledge. Language barriers are minimized through advanced features like speech-to-text conversion and real-time translation, making information accessible across diverse linguistic backgrounds. This fosters a more inclusive and globally connected learning environment. These AI tools are suitable to be integrated in teaching and learning in technical colleges.

Technical colleges are specialized institutions designed to equip individuals with the skills and knowledge required for careers in various skilled trades. These colleges promote self-reliance and meaningful contributions to society. As outlined in the National Policy on Education (FRN, 2014), graduates of technical colleges are expected to secure employment, establish their own businesses, become self-employed, create job opportunities for others, and pursue further education. These goals align with the broader sustainable development agenda, which emphasizes economic growth, productivity, and environmental responsibility. In Nigeria, the objectives of technical colleges highlight their capacity to enhance energy literacy, particularly through curricula that prepare students for trades involving the continuous use of electrical and electronic energy (Musa et al., 2024). Functioning as part of the secondary education system, technical colleges focus on practical, hands-on learning experiences. Students are trained to be self-sufficient, employable, and academically prepared for higher education both in electrical/electronic trades.

Electrical and electronic trades are among the most vital and in-demand technical and vocational subjects offered in technical colleges. These disciplines play a crucial role in advancing Nigeria's goals for industrialization and digital transformation. Recognized under the Technical and Vocational Education and Training (TVET) framework as outlined in the National Policy on Education (FGN, 2014), these trades are instrumental in equipping students with practical skills that support national development. The curriculum in electrical/electronic trades is organized into key areas such as electrical installation and maintenance, electronic systems maintenance, and solar energy systems. Students acquire a wide range of competencies, including wiring systems, circuit design, power distribution, installation, maintenance, and repair of electrical and electronic systems across residential, commercial, and industrial settings. They also learn to use specialized tools, adhere to electrical safety codes, service electronic devices, and gain training in digital electronics, microcontrollers, sensors, and embedded systems. Practical experience includes working with devices such as televisions, radios, amplifiers, and control systems. Graduates of these programs are expected to demonstrate proficiency in troubleshooting and analyzing circuits, designing and interpreting electrical drawings, performing electrical installations, installing solar photovoltaic (PV) systems, maintaining electrical panels and switchgear, and repairing electronic devices. They also master soldering and desoldering techniques using appropriate tools. Electrical and electronic trades are essential to ensuring the availability of reliable energy, supporting advanced technologies, and driving growth in the ICT and manufacturing sectors. As affirmed by researchers such as Dauda & Deba (2023) and Yisa & Saba (2023), students in these programmes are thoroughly prepared to diagnose, repair, maintain, dismantle, and assemble electrical and electronic systems using industry-standard tools and practices. Woodwork trade is one of the hand-on learning in technical colleges in Nigeria.

Woodwork is a dynamic, hands-on trade taught in technical colleges, designed to equip learners with practical skills that foster self-employment, employability, and societal contribution. Students are trained in key areas such as carpentry, joinery, furniture-making, and wood technology, preparing them to become skilled technicians and artisans capable of contributing to industries like construction, manufacturing, and interior design. Woodwork instructors guide students through both manual and machine-based techniques, covering the design, construction, and finishing of wood products. Graduates are expected to demonstrate proficiency in technical drawing using both traditional tools and software applications as well as in measuring, cutting, shaping, and joining wood. They also gain expertise in sanding, staining, varnishing, and producing a variety of wood-based items. According to Musa et al. (2024), woodwork trades in technical colleges involve the development of both cognitive and psychomotor skills across domains such as furniture and cabinet making, upholstery construction, carpentry, wood machining,

and general woodworking. Given the complexity and evolving nature of these skills, the integration of Artificial Intelligence (AI) into woodwork education is increasingly essential. When effectively utilized by technical educators, AI can enhance teaching and learning by promoting independence, awareness, and engagement among both teachers and students. As UNESCO (2025) notes, AI supports personalized learning, improves instructional delivery, and plays a central role in modern educational environments making it a valuable tool in the advancement of woodwork training in technical colleges. AI tools need to be used by technical college teachers to be teaching and learning and carried out research.

Technical college teachers are professionals trained and qualified in both theoretical and practical aspects of instruction, tasked with imparting relevant knowledge and skills to students in technical education settings. According to the American Association of Teachers of German (AATG, 2025), technical teachers are responsible for delivering hands-on training across various institutions, including high schools, vocational schools, and community colleges. They design and implement interactive, engaging lessons that equip students with the technical competencies required for success in their chosen fields, while continuously assessing and adapting instruction to meet learners' needs. As Deebom (2019) emphasizes, technical college teachers must possess formal academic qualifications and be capable of applying pedagogical principles using modern instructional tools. In today's digital age, this means being ICT literate and adaptable to emerging technologies. To effectively prepare students for the demands of the 21st century, technical college teachers must adopt teaching methods that foster critical thinking, creativity, and technological fluency. The integration of Artificial Intelligence (AI) into technical education offers powerful opportunities to enhance practical instruction and skill development. However, this potential can only be realized if technical college teachers are knowledgeable about the appropriate AI tools and understand how to apply them effectively in the classroom. The pressing question remains: Are technical colleges teachers adequately aware of the AI resources available, and do they possess the capacity to integrate these tools into their teaching practices?

Awareness refers to a state in which an individual is conscious, perceptive, mindful, and responsive to a particular concept or phenomenon. In the context of technical education, AI awareness among technical college teachers reflects the extent to which educators understand, recognize, and are prepared to engage with Artificial Intelligence tools in teaching and learning processes. Although technical trade courses are traditionally practical and hands-on in nature, emerging research has demonstrated that various AI tools are well-suited to enhance these practical applications within technical colleges. AI awareness involves not only

understanding what AI is and how it functions, but also having knowledge of specific AI tools, their applications, and the ethical and pedagogical frameworks guiding their use in education. This awareness is closely linked to digital literacy initiatives and structured training programs that aim to improve instructional practices. Such programs empower teachers to operate in digitally advanced environments, leveraging AI tools like debate simulators and AI-powered tutoring systems to deliver personalized and engaging learning experiences (Olokooba et al., 2024). Given the growing relevance of AI in education, it is essential to assess the level of awareness and adoption of AI tools among technical college teachers in Kwara State. This assessment will help identify gaps, inform policy, and guide professional development efforts aimed at integrating AI effectively into technical education.

Statement of the Study

The rapid evolution of Artificial Intelligence (AI) has continued to reshape educational systems globally by enhancing teaching, learning, and research processes. In Nigeria, technical colleges are mandated to equip learners with practical skills in areas such as electrical/electronic technology and woodwork for self-reliance, employability, and national development. However, the extent to which these goals are achieved depends largely on the competence and preparedness of teachers to integrate modern technologies into their instructional practices. While AI offers immense opportunities for personalized learning, improved instructional delivery, and skill development, there are concerns that technical college teachers in Kwara State may not possess adequate awareness of available AI tools nor the strategies required for their effective utilization.

This study, therefore, seeks to assess the level of awareness of technical college teachers in Kwara State on the use of AI tools for advancing teaching and learning, and to identify strategies for improving their knowledge and adoption of such tools. The outcome of the study will provide empirical evidence to guide policymakers, curriculum planners, and educational stakeholders in strengthening teacher capacity, updating instructional practices, and aligning technical education with global technological trends. By addressing the identified gaps, the study will contribute to the preparation of students who are not only technically competent but also responsive to the demands of a knowledge-driven economy.

Purpose of the Study

The main purpose of the study is to assess the Technical Colleges Teachers on the Awareness of Artificial Intelligent (AI) for Advancing Teaching and Learning in Kwara State, Nigeria. Specifically, the study is to:

1. Determine the level of awareness of technical colleges teachers on difference AI tools for teaching and learning in Kwara State.

2. Determine the strategies of improving the awareness and acceptance of AI tools for teaching and learning in technical colleges in Kwara State Nigeria.

Research Question

The following research questions were formulated to guide the study

1. What is the level of awareness of technical colleges teachers on different AI tools for teaching and learning in Kwara State?
2. What are the strategies of improving the awareness and acceptance of AI tools for teaching and learning in technical colleges in Kwara State Nigeria?

Methodology

A survey research design was adopted for this study as it provided an effective means of collecting data from the targeted population. Structured questionnaires served as the primary instrument for gathering information from teachers in technical colleges across Kwara State. The study was conducted in five government-owned technical colleges: Government Technical College, Esie Iludun; Government Technical College, Erinle Ille; Government Technical College, Patigi; Government Technical College, Ilorin; and Government Technical College, Amodu Asungbolu. The target population comprised 50 respondents, all of whom were included in the study. Due to the manageable size of the population, no sampling technique was employed. Two types of questionnaires were employed in this study. The first consisted of 20 items aimed at identifying AI tools applicable to teaching in technical colleges and assessing the level of awareness among technical teachers regarding these tools. The second questionnaire comprised 12 items focused on exploring strategies to enhance teachers' awareness and understanding of AI tools used in instructional practices. Both questionnaires were closed-ended and developed by the researchers, drawing upon insights from a comprehensive review of related literature. This ensured that the instruments were grounded in existing research and aligned with the study's objectives. All the questionnaires administered were successfully retrieved, resulting in a 100% response rate. The data collected was systematically organized and analyzed in alignment with the study's research questions. Analysis was conducted using the Statistical Package for the Social Sciences (SPSS), version 27, employing descriptive statistics such as mean and standard deviation. Decisions regarding the research questions were guided by the mean scores, interpreted based on the lower and upper limits of real numbers as presented in Table 1. The standard deviation was used to assess the degree of consensus among respondents. A standard deviation value below 1.96 indicated that responses were closely clustered around the mean, reflecting a high level of agreement. Conversely, a standard deviation equal to or greater than 1.96 suggested significant variability in responses, indicating divergence in participants' views.

Table 1:
Interpretation of Four Point Scale

S/N	Scale of R.Q 1	Scale of R.Q 3	Point
1	Highly Aware	Highly Agree	3.50 – 4.00
2	Aware	Agree	2.50 – 3.49
3	Slightly Aware	Slightly Agree	1.50 – 2.49
4	Not Aware	Not Agree	1.50– 1.49

Result

Research Question1: What is the level of awareness of technical colleges teachers on different AI tools for teaching and learning in Kwara State?

Table 2:
Responses of respondents on the level of awareness of technical colleges teachers on different AI tools for teaching and learning in Kwara State.

SN	Items	Mean	Std. Deviation	Remarks
1	Natural Language Processing (NLP)	1.70	1.02	SA
2	ClickUp	1.60	1.21	SA
3	Chatbots	2.90	1.15	A
4	Majic Image generation	1.74	1.05	SA
5	Intelligent Tutoring Systems	1.60	1.21	SA
6	ChatGPT	2.86	1.18	A
7	WhatsApp Meta AI	3.40	.81	A
8	Grammarly	2.80	1.18	A
9	Padlet	1.50	.81	SA
10	Presentation Translator	1.60	1.03	SA
11	Smartboards	2.82	1.19	A
12	Intelligent Augmentative/Virtual Reality	1.70	1.02	SA
13	AutoDesk AI	1.68	1.02	SA
14	Labster AI	1.44	.91	NA
15	Electrical Installation Intelligence Tutor (EIIT)	1.48	1.01	NA
16	Multisim Live	1.40	1.04	NA
17	Tinkercad Circuits	1.34	.69	NA
18	Google Assistant	2.00	1.28	SA
19	Perplexity.ai	1.32	1.03	NA
20	Jasper A	1.21	1.21	NA

KEY: SA=Slightly Aware, A= Aware, NA= Not Aware

Table 2 shows that items 3, 6, 7, 8, and 11 with the mean ranges between 2.80-2.90 indicated awareness which means the respondents agreed that they are aware of those AI tools for teaching in technical colleges in Kwara State. Also, items 1, 2, 4,

5, 9, 10, 12, 13 and 18 with the mean ranges between 1.60-2.00 show slightly aware meaning the respondents are slightly aware of those AI tools for teaching in technical colleges in Kwara State. In addition, items 14, 15,16, 17, 19 and 20 have their mean value within the rage of not aware (1.21-1.48). This indicated that the respondents are not aware of those AI tools for teaching in technical colleges in Kwara State. The table also shows the standard deviations (SD) of all items are within the ranges of 0.69 to 1.28 and are positive and less than the normal deviate of 1.96, thereby indicating that respondents were not too far from the mean and from one another in their responses.

Research Question 2: What are the strategies of improving the awareness and acceptance of AI tools for teaching and learning in technical colleges in Kwara State Nigeria?

Table 3:

Responses of respondents on the strategies of improving the awareness and acceptance of AI tools for teaching and learning in technical colleges in Kwara State Nigeria.

SN	Items	Mean	Std. Deviation	Remarks
1	Organize regular workshops and seminars focused on AI in technical education.	3.30	1.02	A
2	Organize AI online course that technical colleges teachers on their own pace	3.70	.46	SA
3	Organize AI awareness campaigns	3.10	1.23	A
4	Uses of AI posters and other AI visual aids regularly	3.00	1.01	A
5	Teacher-students collaboration	2.60	1.03	A
6	Develop a policy that will enforce AI the utilization and support reward	3.00	.90	A
7	Ensure teachers have access to quality internet, adequate electricity and AI supporting tools	3.40	.81	A
8	Upskilling and reskilling of AI tools by the teachers	2.70	1.11	A
9	Encourage technical college teachers to use AI tools during teachings, assignment and feedback	3.50	.68	SA
10	Curriculum updates to include AI literacy and digital pedagogy	3.30	1.02	A
11	Peer learning communities where teachers share AI use cases	3.20	.99	A
12	Government and institutional support for AI integration	2.80	1.18	A
	Grand total	3.13		**A**

Table 3 shows that items 2 and 9 with the mean value of strongly agreed (3.50-3.70) this indicated that the respondents agreed that those strategies can improve the level of awareness of technical colleges teachers on AI tools that could be used for teaching and learning. Also, items 1, 3, 4, 5, 6, 7, 8, 10, 11 and 12 with the mean value of agrees (2.60-3.50) show that the respondents agree that those strategies can be used to improve the level of awareness of technical colleges teachers on AI tools for teaching. Meanwhile, the grand total with the mean value of 3.13 falls at the agree level meaning the respondent agreed with all the items to be a positive strategy for improving the awareness level of technical colleges teachers. The table also shows the standard deviations (SD) of all items are within the ranges of 0.46 to 1.23 and are positive and less than the normal deviate of 1.96, thereby indicating that respondents were not too far from the mean and from one another in their responses.

Summary of Findings

1. Technical college teacher in Kwara State is aware of some of the AT tools. It is also revealed that they are slightly aware of some of the AI tools, meanwhile there are other AI tools that can be used for practical purposes that they are not aware of.
2. All the strategies list for improving the awareness level of technical teachers on AT tools were agreed to by the respondents.

Discussion of Finding

Based on the first research question, which sought to examine the level of awareness among technical college teachers regarding AI tools applicable to teaching and learning, findings revealed that teachers are familiar with several commonly used AI tools. These include Chatbots, ChatGPT, WhatsApp Meta AI, Grammarly, and Smartboards tools widely recognized for their roles in writing assistance, research support, and grammar correction. This finding aligns with the study by Olokooba et al. (2024), which identified WhatsApp Meta AI as the most recognized AI tool among Civic Education teachers in senior secondary schools in Kwara State, with a significant proportion of respondents demonstrating awareness. Similarly, Okafor and Anyanwu (2025) reported that secondary school teachers in Anambra State were aware of a limited number of globally recognized AI tools, such as Google Assistant Voice and Turnitin, while many AI resources remained largely unfamiliar within the educational context. Further analysis revealed that technical college teachers exhibited partial awareness of additional AI tools, including Natural Language Processing (NLP), ClickUp, Majic Image Generation, Intelligent Tutoring Systems, Padlet, Presentation Translator, Intelligent Augmentative/Virtual Reality, AutoDesk AI, and Google Assistant. These tools are commonly used for presentations and general-purpose applications across both educational and non-educational domains.

The study revealed that technical college teachers exhibit limited awareness of several AI tools specifically designed for practical applications. Tools such as Labster AI, Multisim Live, Perplexity.ai, Jasper AI, Tinkercad Circuits, and Electrical Installation Intelligence Tutor (EIIT) are highly suitable for enhancing hands-on learning and technical instruction. However, these tools remain largely unfamiliar to many educators in technical colleges. This finding aligns with the study by Olokooba et al. (2024), which reported low levels of awareness regarding AI tools like Perplexity.ai, Jasper AI, and Llama 3 by Meta. The limited recognition of these tools may be attributed to their recent emergence or minimal promotion within the education sector. Similarly, Magdeline et al. (2024) found that only 10% of college teachers demonstrated a high level of AI awareness and utilization in classroom teaching, while 50% showed average awareness and 40% exhibited low levels of familiarity and use. These findings underscore a broader issue: the overall low level of AI awareness among technical college teachers poses a significant barrier to the effective integration of AI into teaching and learning. Without adequate knowledge and exposure, educators may struggle to identify and implement appropriate AI tools that could enhance instructional delivery and student engagement. Addressing this gap is essential for aligning technical education with modern technological advancements.

Findings from research question two revealed that several strategic interventions, if properly implemented, could significantly enhance the awareness of technical college teachers regarding AI tools suitable for teaching and learning. Key strategies include organizing self-paced online AI courses tailored for technical educators. Many of these courses are freely accessible and, when systematically introduced, can broaden teachers' understanding and familiarity with AI applications in education. Additional approaches such as seminars, workshops, and targeted upskilling and reskilling programs are also effective in raising awareness and competence in using AI tools. This aligns with the study by Goksel and Bozkurt (2019), which emphasized that short-term training programs enable teachers to explore practical ways of integrating AI-based tools into their instructional practices. Similarly, Okafor and Anyanwu (2025) supported this view by identifying increased funding for schools and the provision of AI resources as critical strategies for enhancing curriculum implementation through AI. Magdeline et al. (2024) further affirmed that participation in relevant training significantly boosts teachers' awareness of artificial intelligence. They recommended that educational institutions establish structured, ongoing professional development programs focused on AI and ICT integration to ensure sustained growth in teacher capacity and technological fluency.

Conclusion

Effective teaching and learning in technical colleges increasingly demand the integration of Artificial Intelligence (AI) tools to align with global trends in digitalization and technological advancement. However, this integration is only achievable when educators are knowledgeable and actively utilize these tools in their instructional practices. This raises a critical question: Are technical college teachers sufficiently aware of the AI tools available for educational use? To address this, a study was conducted among technical college teachers in Kwara State. The findings revealed that while teachers are familiar with several general and widely used AI tools, such as ChatGPT and Grammarly, their awareness of more specialized AI tools designed to support practical and hands-on learning remains limited. These lesser-known tools, which could significantly enhance technical instruction, are not yet widely recognized or adopted by educators. Furthermore, the study identified numerous strategies that could be implemented to improve teachers' awareness and utilization of AI tools. These include professional development initiatives such as workshops, seminars, online courses, and targeted training programs all aimed at equipping technical educators with the skills and knowledge necessary to integrate AI effectively into teaching and learning processes.

Recommendation

Based on the findings of the study, the following recommendations were proposed:

1. School management should facilitate seminars and workshops focused on appropriate and relevant AI tools. These programs should be tailored to enhance teachers' understanding and practical application of AI in technical education.
2. The Ministry of Education, through the Technical School Board, should undertake a comprehensive review of the technical college curriculum. This review should aim to integrate AI tool applications into teaching and learning processes, thereby aligning technical education with current technological advancements and global best practices.

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