EXAMINING TEACHER'S USE OF AI TOOLS FOR INSTRUCTIONAL QUALITY IN NIGERIAN UNIVERSITIES

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Abstract

The integration of Artificial Intelligence (AI) into education has taken center stage in all discussions of importance in education. Almost all higher education instructions in Nigeria are making frantic efforts to ensure that teachers in various disciplines utilize the opportunity afforded by AI technology in pedagogical activities. This study investigates if incorporating AI tools in lesson preparation, professional development, and method of teaching influences instructional quality. To understand the mechanisms through which the relationship might exist, a random sampling technique was adopted in the study to sample 326 university teachers across disciplines in Nigerian universities. The result of the regression analysis showed that the professional development of teachers in the integration of AI tools in teaching and learning significantly influenced instructional quality. Therefore, the result recommended among others that teachers have to avail themselves of the opportunity to use AI tools for teaching, they need to undergo training on how to appropriately integrate AI tools.

Keywords: *Examining, Teacher, AI Tools, Instructional, Quality.*

Introduction

The education sector has always faced numerous challenges in both its internal and external environments over the years. However, it has continuously responded to these emerging challenges, with technology being a significant factor. The connection between education and technology has garnered considerable attention, resulting in the formulation of new educational policies and practices in many countries worldwide. The sector is increasingly leveraging various technologies to mitigate these challenges. Presently, teaching in universities has become more demanding due to the emergence of new technology, leading universities globally to advocate progressively for the use of Artificial Intelligence (AI) in teaching and learning (Ogba, et-al 2022). An important aspect of university education is ensuring the delivery of quality instruction to meet the manpower needs of all sectors of the economy. This assurance is aimed at achieving effective workforce preparation through high-quality education.

Instructional quality has long been a concern for stakeholders due to the impacts brought about by societal changes. Tengberg et al. (2021) assert that instructional quality has received increased attention over the past decades. According to Scott (2009), a complex set of social, economic, technological, and political forces is influencing higher education, emphasizing the need for optimal assurance of instructional quality to address these challenges. Bess (1997) argues that the effectiveness of any system, whether in higher education or elsewhere, depends significantly on the quality of teaching creativity (Allen et al., 2011; Clarke et al., 2006; Ocho, 2004). What is taught and how much is learned depends largely on the quality of instruction provided by the teacher (Bess, 1997). Olusegun (2017) maintains that instructional quality encompasses all teaching

and learning interactions in the classroom, using appropriate instructional strategies to facilitate lasting learning. Resonating with the above views, it is obvious that quality of teaching and learning are vital components of quality education as educational progress always oils the engine of societal progress. Hence every educational institution should always key into innovative activities for them to remain visible.

The rapid advancement of technology is a new paradigm that underscores the importance of integrating AI into teaching and learning processes. The goal is to ensure that all students are well-prepared for academic progression and professionalaccomplishment. It is widely acknowledged that artificial intelligence (AI) represents a transformative technology that significantly influences young people's lives, sparking deep curiosity and excitement among them. Researchers like Szołtysek and Stęchły (2023) advise that educators should engage with narratives from computer scientists to augment their knowledge beyond traditional sources like books, and some other traditional articles aiding in informed decision-making (Naidu, 2023; Geesje van den et al., 2023). They posit that AI is here to stay, and universities should embrace technological advancements rather than resist them based on preconceived notions. It has become no surprise that the interaction between students and technology has been acknowledged as having significant potential for facilitating positive educational outcomes.

Incorporating technology into teaching and learning can offer innovative and meaningful methods to achieve learning outcomes, transforming learning into an engaging activity. Keuning and van Geel (2021) affirm that AI not only enhances student learning performance and engagement through intelligent tutoring systems and adaptive learning platforms but also reduces teachers' administrative burdens, allowing them to focus more on direct student interaction. AI supports personalized learning experiences, fosters interactive environments, and provides valuable data-driven insights. Additionally, AI facilitates effective formative and summative assessment of students' complex knowledge (Chen et al., 2021). Research also indicates that AI tools assist teachers in evaluating the teaching process, planning lessons, and implementing them effectively (Celik et al., 2022). Integrating AI tools into teaching and learning is a natural progression, given the opportunities it offers humanity.

Various AI tools such as ChatGPT, ChatPDF, QuillBot, Copilot, Canvas, Google Bard, Fireflies, Grammarly, Gradescope, Otter.ai, SlidesAI, Midjourney, Gamma, AskNow, Jasper, Typewise, Paperpal, Tome, Loopin, Krisp, Taskade, Intelligent Tutoring Systems, Adaptive Learning Platforms among others, have garnered renewed attention for their potential to enhance teaching and learning. Naidu (2023) opines that AI tools, with their vast knowledge base, can provide educational support to teachers from diverse geographical, social, and cultural backgrounds, ensuring equal access to resources, research articles, and materials for lesson planning. In other words, every educational system worldwide, including Nigeriacannot promote instructional quality without the application of technological tools, with AI at its core. According to Kurubacak and Altinpulluk (2017) AI provides numerous transformative ideas in education, improving the attractiveness, profitability, and sustainability of teaching and learning for all. Szołtysek and Stęchły (2023) note that AI tools do not diminish the importance of lesson planning in classroom instruction. Adamu, Aliyu, and Aliyu (2023) affirm that AI tools enhance the acquisition and delivery of knowledge, playing a transformative role and supporting teachers in lesson preparation and delivery. Lynch (2021) postulates that AI does not weaken classroom instruction but rather supports improvement in lesson delivery and outcomes. Ogba et-al (2022) maintain that lesson preparation plays a vital role in ensuring the accomplishment of educational curriculum as it directs teachers in classroom teaching, signaling the time and duration, classroom management, clarity of focus, student engagement, and teacher confidence in lesson delivery. This shows how important lesson preparation is to successful teaching and learning, advocating for a well-organized and engaging, classroom.

The proliferation of AI benefits students through enjoyable instructional activities that increase motivation and interest, reduce cognitive load, provide opportunities for questioning, and foster interaction between students and teachers. This provides new avenues for individualized learning, and clarification of abstract concepts, and enhances the efficiency of the learning process (Geesje et al., 2023; Jørgensen, 2023). Teachers, on the other hand, benefit from AI by creating a conducive classroom environment, fostering student creativity, and critical thinking, and enabling effective lesson preparation, assessment, and evaluation. According to Kasneci (2023), as a schoolteacher, developing a thoughtful lesson plan is essential as it provides a roadmap to ensure comprehensive coverage of necessary learning activities in a logical and organized manner. Effective lesson planning is crucial for communicating effectively, managing time efficiently, engaging students, and providing accurate data for assessment and evaluation, although the AI tools are faster in data provision, assessment, and evaluation tasks(Kurubacak and Altinpulluk, 2017.Lesson preparation with AI tools is to be encouraged though it may not reduce instructional quality since most of the teaching will be

practical, individualized learning and the role of a teacher is mostly guidance (Ogba & Edeh, 2021).

Tuomi (2018) suggests that although AI is often portrayed as rapidly becoming super-intelligent and gaining various perceptionsboth positive and negativefrom popular culture, currently AI systems are severely limited due to some observable constraints. (Celik et al., 2022; Pisaca, et-al, 2023)maintain that thereare technical, social, economic, scientific,individual perceptions, fears,and conceptual constraints that define the extent of what AI can achieve.The integration of AI into education aims to effectively phase out outdated instructional methods and practices that may not be relevant for future teaching and learning (Tuomi, 2018). AI has revolutionized teaching by bringing about a paradigm shift in pedagogical practices. According to Celik (2023), AI has introduced transformative changes by reshaping traditional teaching methods. Zawacki-Richter et al. (2019) maintain that AI has challenged traditional teaching methodologies, paving the way for a dynamic, adaptive, and personalized future of teaching. This transformation makes teaching more effective and empowers teachers with data-driven insights and innovative teaching tools.AI technology can effectively enhance teaching when teachers possess the necessary knowledge and skills to utilize AI tools appropriately (Cavalcanti et al., 2021; Edwards et al., 2018). Adequate training in the application and utilization of AI tools will boost teachers' confidence, student motivation, and engagement (Wang et al., 2021).(Bryant et al. 2020; Miao and Holmes 2021b) believe that AI will save teachers time, while Seldon and Abidoye (2018) believe that AI scaling up may make teachers de facto redundant or reconfigured roles as orchestrator/technology facilitators employed to manage learner behavior and switching technology.

Professional development of teachers is crucial for successfully transforming teaching methodologies. Teacher professional development aims to enhance teaching practices and effectiveness through various methods, such as asynchronous or synchronous online training, seminars, small groups, conferences, workshops, and mentorship programs. These development opportunities equip teachers with professional skills that enhance performance and improve student outcomes. The primary purpose of professional development is to improve teachers' practices and pedagogical methods. According to Ogba and Igu (2013), professional development allows teachers to hone their skills and acquire new insight and knowledge, making them feel more fulfilled and empowered. In summary, teachers' professional development fosters feelings of fulfillment, empowerment, and confidence to create engaging classrooms. Ultimately, it motivates teachers to identify students' areas of weaknesses or strengths (needs, abilities, attitudes) and organize remedial classes, feedback lessons, or other teaching-based interventions to help students. As Fullman and Scott (2009) assert, good ideas without effective implementation are wasted ideas. Olusegun (2017) emphasizes that the success of students is the joy of the teacher, highlighting that professional training equips teachers with innovative ideas, methods, and strategies for effective lesson planning. This not only enhances student engagement and teachers' confidence but also contributes to the attainment of educational goals and objectives.

Teachers need to continually develop themselves with AI systemsto avoid the digital divide that hinders professional progression (Bryant, et al, 2020). Simply put, professional development with AI aids teachersin uncovering new insights and boosts their enthusiasm for exploring more ideas using AI tools.Professional development with AI technologies helps teachers drive positive changes in their locality and globally (Pisaca, et-al, 2023).This may be whyTuomi (2018) affirms that AI is scaling up, it will successfully change old institutional structures and practices that may not be germane for the future.Without further training on the use of AI tools, teachers will remain digital immigrants because these present students who are digital nativeshave gone ahead with technological insight. Pisaca, et-al, (2023) affirm that the AI training process for all teachers involved in the pedagogical activities in schools is essential to make the system operational, and a strategic vision toward AI implementation needs. Teachers lack the necessary skills of AI usage, hence, for teachers to adapt to the new methods they need training to perform their tasks successfully.

Professional development of teachershelps in augmenting theirqualifications and enhancing their competencies through training. This is essential to professionally augment their knowledgeand academic quality (Pozarnik, 2009). In this paper, quality instruction is defined as the extent to which instruction is effectively packaged and delivered to meet students' learning engagement, interests, and expectations while aligning with the standards outlined in the curriculum. It involves adequate lesson preparation, effective use ofesoteric skills, current knowledge of subject content, technological competency, resourcefulness, and teachers' dispositional traits.

Despite the significant benefits associated with AI tools in promoting teaching, several limitations which include lack of skills, financial problems, network issues, digital literacy, data availability, technical skills, and negligence need to be addressed. These challenges are particularly pronounced in Nigerian universities, where the adoption of AI technology for instructional quality is still in its nascent stages. The

potential for AI systems to provide inaccurate or biased responses, be misused or inadequately deployed, and compromise data integrity and ethical standards further complicates the landscape. Issues such as copyright and plagiarism (Olusegun, 2019) add to the concerns surrounding the integration of AI in educational settings. Ogba and Edeh (2021) highlight the numerous queries regarding the potentialities and threats associated with AI in education. While authors like Kasneci et al. (2023) and Saunders (2023) analyze the opportunities AI presents and how it could revolutionize teaching and learning, they also express concerns about AI-generated misinformation, biases, and ethical implications. Ghashim and Arshad (2023) affirm that the impact of technology has forced many educational institutions to change their teaching and learning methods, but they must ensure that their staff are trained for the usage.

Consequently, teachers are required to adopt modern methods using AI that promote active collaboration (Ning & Hu, 2012). However, the convergence of several technologies, including ubiquitous wireless sensor connections and machine communication, is rendering traditional teaching methods obsolete (Stankovic, 2014). Vermesan and Friess (2013) argue that university education should prioritize the opportunities provided by AI technology to develop innovative teaching methods that engage students in learning. Qualitative approaches to instructions are incredibly diverse, complex, and nuanced. With this paper, we hope to strike a balance between the professional development of teachers and lesson preparation with AI tools and how they influence instructional quality by ensuring flexibility about how each variable is used, so that it does not become limited, and loses one of its key advantages of AI technology in pedagogical activities. Given these considerations, this research aims to examine the use of AI tools by teachers for instructional quality in Nigerian universities. It seeks to identify if instruction qualitywith AI integration in the classroom is influenced by the professional development of teachers with AI and lesson preparation with AI tools canimpact teaching effectiveness and student engagement. By addressing these issues, the study aims to contribute to the development of a more robust and effective educational framework that leverages AI technology to enhance instructional quality in Nigerian higher education institutions. The findings will contribute significantly to understanding the role of AI in education and inform future professional development and policy decisions in Nigerian higher education institutions.

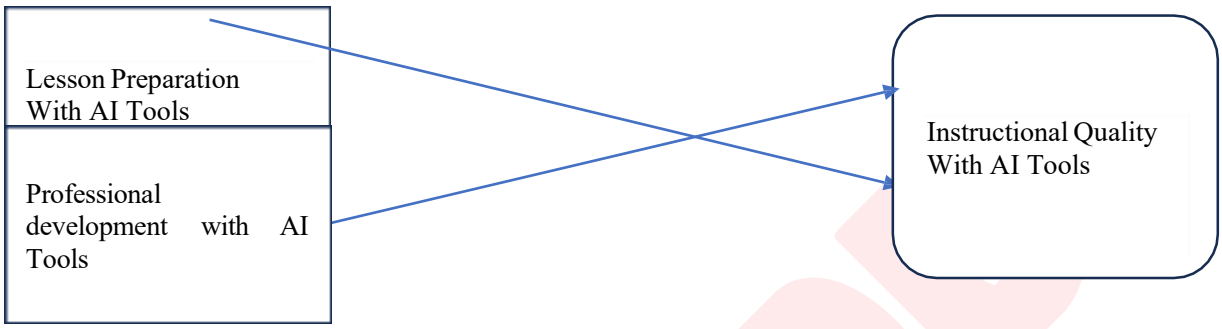
Theoretical Framework

We anchor the theoretical underpinning of this study on the Internet of Things (IoT) which has been seen as a paradigm transforming the way we live and interact with technology. IoT was developed by British-born technologist Kevin Ashton in 1997 was coined by Ashton in 1999 while working at Procter & Gamble, where he proposed using radio-frequency identification (RFID) chips on products to track them through the supply chain. Theoretical foundations of the Internet of Things (IoT) highlight its transformative potential in education by emphasizing the interconnectivity of devices, sensors, and networks, fostering seamless communication and data exchange (Lee et al., 2023; Ning & Hu, 2012; Lee et al., 2013). In the context of Nigerian universities, IoT can significantly enhance instructional quality by providing actionable insights into student engagement, enabling innovative teaching approaches, and offering more opportunities for topic selection and teaching techniques (Letting & Mwikya, 2023; Ghashim & Arshad, 2023). Integrating AI tools within IoT frameworks can track and analyze academic activities, supporting teachers in refining lesson preparation and delivery (Chweya et al., 2020). As IoT continues to gain momentum, it inspires enthusiasm for incorporating technology in education to improve teaching and learning outcomes (Gatsis & Pappas, 2017; Kumar, Tiwari, & Zymbler, 2019; Sfar et al., 2017). This study examines the use of AI tools by teachers to enhance instructional quality in Nigerian universities, leveraging the transformative capabilities of IoT. Building upon the theoretical framework and extant literature reviewed in the current study, we propose the following hypotheses as depicted in Figure 1 below:

Hypothesis 1: Teacher's use of AI tools for lesson preparation would significantly improve quality instruction.

Hypothesis 2: Teacher's use of AI tools for professional development would significantly improve the quality of instruction.

Table 1: Conceptual Model



Methods

This study employed a cross-sectional research design to obtain a detailed and comprehensive understanding of the use of AI tools for instructional quality, professional development, and lesson preparation among university teachers. This approach was chosen to capture the current practices and perceptions of Nigerian university lecturers regarding AI tools in pedagogical activities. This structured approach was used to provide robust and reliable insights into how AI tools are utilized by lecturers in Nigerian universities for instructional quality. This methodical approach ensures a comprehensive examination of the key factors influencing the quality of instruction through AI tools, providing a solid foundation for generalizing the findings to a broader population.

Population and Sample

The population for this study comprised teachers from Nigerian public universities. The sample included lecturers from various Nigerian universities, selected due to their diverse levels of experience, perceptions, and commitment to using AI technology for quality instruction. A self-structured questionnaire was administered to gather data from participants during the 4th annual hybrid conference titled "Re-inventing Wheels of Education for National Security and Economic Enhancement," held on June 25-28, 2024, by the Faculty of Education at Alex Ekwueme University Ndufu-Alike, Ebonyi State, Nigeria, the questionnaire was distributed to participants face-to-face. Before distribution, participants were assured of anonymity and confidentiality. The questionnaire consisted of two parts:Part A collected demographic information about the participants. Also, part B contains items related to the use of AI tools in lesson preparation, professional development, and quality instruction.The researchers self-developed the measurement instrument from the extant literature having drawn from previous literature on instructional quality and, the use of generative AI for professional development and lesson planning, for example, the seven items for instructional quality were derived from previous literature (Abeywickrama, 2021;Adamu, etal., 2023; Asiyahi et al., 2021; Olusegun, 2017). Data were collected from 374 respondents. After screening and removing 48 incomplete or missing responses, a final dataset of 326 completed questionnaires (87.17% response rate) was used for analysis.Participants were informed about the study's purpose, assured of confidentiality and anonymity, and provided consent before participating.

Table 2shows the Measurement Scales for measuring the variables in the current study.

S/N	Variables with Items	Cronbach's Alpha ReliabilityCoefficients
	Instructional Quality	
1	My use of generative AI tools has improved the clarity of organization of my lessons	**0.87**
2	Students find my AI-enhanced lessons more engaging and informative	
3	AI-generated materials have positively impacted my student learning outcomes	
4	The integration of AI tools has increased my effectiveness as an instructor	
5	I have noticed an improvement in student participation and interaction since using AI tools	
6	The use of AI tools has enhanced my ability to provide timely and constructive feedback	
7	Overall, AI tools have significantly contributed to the quality of instruction I	

	deliver	
	Teacher Use of Generative AI for Professional Development	**0.79**
8	I use AI tools to stay updated with the latest teaching methodologies	
9	Generative AI helps me identify relevant professional development opportunities	
10	I utilize AI to accesseducational research articles and resources	
11	AI tools assist me in personalizing my professional development plans	
12	I rely on AI to generate insights and feedback on my teaching practices	
13	AI platforms provide me with valuable training modules and tutorials	
14	I use AI-generated data to track my progress in professional development	
	Items on Teachers Lesson Preparation	**0.82**
	Teacher Use of Generative AI for Lesson Preparation	
15	I regularly use generative AI tools to create lesson plans	
16	Generative AI assists me in developing interactive and engaging lesson content	
17	I rely on AI-generated materials to supplement my teaching resources	
18	The use of AI tools helps me to align my lesson objectives with the curriculum	
19	I utilize AI to generate quizzes and assessments for my students	
20	AI tools save me time in preparing lesson outlines and summaries	
21	I find AI-generated content enhances the overall structure of my lessons	

Data Analysis and Results

Multiple linear regression analysis was employed to interpret the relationships between the independent variables (teachers' use of generative AI for lesson preparation and professional development) and the dependent variable (instructional quality). This method allowed for the examination of how the use of generative AI for lesson preparation and professional development influences instructional quality.Cronbach alpha was used to establish the internal consistency reliability of the instrument as reported in Table 1.We employed regression analysis at 95% confidence intervals. The analysis showed a good model fit: $F(2, 122) = 2.338$, $p < .001$, Adjusted R^2 change=.038 and R^2 change=.069. The analysis showed teachers' use of AI tools for professional development significantly improved instructional quality ($\beta = 0.20$, $t = 2.11$, $p < .05$). Hence hypothesis one was accepted. The analysis of hypothesis two showed that the teacher's use of AI for lesson preparation was not positively contributing to instructional quality ($\beta = 0\text{-}.10$, $t = -1.1$, $p = .30$), hence hypothesis two was rejected. The value inflation factor (VIF) showed no evidence of multicollinearity in the data set.

Table 3: shows the Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.192[a]	.038	.021	.94315	.069	2.338	2	122	.101

a. Predictors: (Constant), lesson, professional

Table 4: shows the Coefficient

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	2.725	.736		3.700	.000	1.267	4.183		
	professional	.307	.142	.209	2.115	.033	.025	.589	.837	1.194
	Lesson	-.171	.166	-.101	-1.135	.303	-.499	.156	.837	1.194

a. Dependent Variable: instructional quality

Discussion

The result of hypothesis one suggests that AI will fundamentally change how teachers teach, highlighting the necessity for professional development. Resonating with existing research literature (Abeywickrama, 2021; Asiyahi et al., 2021; Bryant et al., 2020) on the use of AI technology for teaching and learning, the findings suggest that teachers who engage in professional development are more likely to embrace innovations and commit to facilitating deep, engaged, and experientially based learning, empowering students with AI support. Education is often considered "the great equalizer," with the potential to improve the economic, social, and cognitive circumstances of a nation. As custodians of pedagogical activities, teachers should avail themselves of every opportunity for training to integrate innovative AI tools into teaching, making it more interesting and activity based. This outcome aligns with Vermesan and Friess (2013), who emphasized that university education should prioritize the opportunities provided by AI technology to develop innovative teaching methods. The finding also supports Olusegun (2017), who noted that professional development enables teachers to acquire new skills. Similarly, Ogba et-al (2022) assert that professional development allows teachers to hone their skills and gain new insights and knowledge, making them more committed, fulfilled, and empowered. In summary, teachers' professional development fosters satisfaction, empowerment, and confidence to create engaging classrooms. Instructional quality significantly depends on teaching creativity (Allen et al., 2011; Clarke et al., 2006), which is a product of training (Ocho, 2005).

The analysis of hypothesis two showed that teachers' use of AI for lesson preparation did not positively contribute to instructional quality, leading to the rejection of hypothesis two. This outcome is surprising given the critical role lesson preparation plays as a roadmap for teachers, impacting their effectiveness and students' academic performance. The result challenges the widely held assumption that integrating advanced technology, such as generative AI, inherently enhances educational practices(Barrett & Pack, 2023; Pack & Maloney, 2023). Several factors may underline this finding. First, the proficiency and familiarity of teachers with AI tools might be insufficient, resulting in suboptimal utilization that fails to translate into tangible instructional improvements. Second, AI-generated content, while innovative, may lack the contextual relevance and adaptability that experienced educators bring to lesson planning. Additionally, the dependence on AI might inadvertently reduce the creative and critical engagement of teachers in their lesson preparations, leading to a more mechanistic and less dynamic instructional approach (Pack & Maloney, 2023). This outcome underscores the necessity for comprehensive training and support for teachers in effectively integrating AI tools, ensuring that technological advancements are harnessed to genuinely augment, rather than inadvertently diminishing the quality of education (Barrett & Pack, 2023). It also highlights the importance of continuous evaluation and refinement of AI applications in educational settings to align with pedagogical goals and enhance instructional efficacy.Ogba and Igu (2013) highlighted the importance of lesson preparation in classroom teaching, including time management, classroom control, clarity of focus, student engagement, and teacher confidence. While Adamu et al. (2023) and Celik et al. (2022) affirmed that AI tools assist teachers in lesson preparation and implementation for effective delivery, Lynch (2021) claims that AI supports rather than weakens classroom instruction. The rejection of hypothesis two may be because AI encourages individualized learning, positioning the teacher more as a facilitator or guide (Ogba & Edeh, 2021). Acknowledging the fundamental role of lesson preparation in teaching and learning, the outcome might also suggest that teachers' work is primarily administrative.

Conclusion and Implications for Practice

The study's findings present a nuanced perspective on the role of AI in education. While the use of AI tools for professional development significantly enhanced instructional quality, validating hypothesis one, the application of AI for lesson preparation did not yield a positive impact, leading to the rejection of hypothesis two. These results suggest that while AI can be a powerful tool for enhancing teachers' professional growth and pedagogical skills, its direct application in lesson preparation may not automatically translate to improved instructional quality. Consequently, it is recommended that educational institutions focus on providing comprehensive AI training and support tailored to professional development needs, ensuring teachers can effectively integrate AI insights into their pedagogical practices (González-Pérez & Ramírez-Montoya, 2022; Pack & Maloney, 2023). Additionally, further research should explore how AI tools for lesson preparation can be optimized to better support instructional goals, possibly through more personalized and contextually relevant applications. Emphasizing a balanced approach that leverages AI for both professional development

and instructional support, with a strong foundation of teacher training, can lead to more effective and meaningful educational outcomes (Tseng & Warschauer,2023; Yang, 2023).

The findings of this study have important implications for educational practice. First, the significant positive impact of AI tools on teachers' professional development suggests that investing in AI-driven professional growth programs can enhance instructional quality. Educational institutions should prioritize the integration of AI in continuous professional development initiatives to empower teachers with up-to-date pedagogical skills and knowledge (Yang, 2023; Yeo, 2023). Second, the lack of a positive impact from AI use in lesson preparation indicates that teachers need targeted training to effectively utilize AI for this purpose. Schools and universities should provide professional development focused specifically on the application of AI in lesson planning, ensuring that teachers can harness the technology in ways that genuinely enhance instructional quality(Barrett & Pack, 2023). Finally, policymakers and educational leaders should support ongoing research and development to refine AI tools for educational contexts, ensuring they are intuitive, contextually relevant, and aligned with educational objectives. By addressing these areas, educators can maximize the benefits of AI, ultimately leading to more effective teaching and improved student outcomes (Farrokhnia et al., 2023).

Limitations of the Study

While this study provides valuable insights into the impact of AI tools on instructional quality, several limitations should be noted. First, the reliance on quantitative research methods, specifically regression analysis, may not capture the full complexity of how AI tools are used in educational contexts. Qualitative data could provide deeper insights into the nuances of teachers' experiences and the contextual factors influencing AI integration. Second, the study is limited to a specific geographical context, Nigerian universities, which may affect the generalizability of the findings to other educational settings with different technological infrastructures and educational policies. Third, the self-reported nature of data on teachers' use of AI tools might introduce bias, as teachers may overestimate or underestimate their actual usage and its impact. Finally, the study's cross-sectional design captures a snapshot in time, limiting the ability to conclude long-term effects and changes in instructional quality over time. Future research should consider longitudinal approaches and incorporate mixed methods to provide a more comprehensive understanding of the impact of AI tools on education.

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