ADAPTATION OF GENERATIVEARTIFICIAL INTELLIGENCE FOR MICRO TEACHING IN COLLEGES OF EDUCATION, NIGERIA

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Abstract

Microteaching is a crucial component of teacher training programs, allowing prospective teachers to practice instructional techniques on a smaller scale before engaging with full classrooms. However, traditional microteaching methods can be time-consuming and resource intensive. The adaptation of artificial intelligence (AI) technologies presents an innovative solution to enhance the microteaching experience in Nigerian Colleges of Education. AI-powered systems can simulate realistic classroom scenarios, providing preservice teachers with virtual students that exhibit diverse behaviours and learning needs. This immersive environment allows trainees to practice classroom management, differentiated instruction, and assessment techniques without the constraints of physical limitations. Additionally, AI can provide real-time feedback and analysis, identifying areas for improvement and offering personalized guidance. The integration of AI in microteaching holds numerous benefits. It reduces the logistical challenges associated with coordinating live microteaching sessions, enabling more frequent practice opportunities. AI-driven simulations can expose trainees to a wide range of classroom situations, better preparing them for the complexities of real-world teaching. Furthermore, the objective nature of AI-based feedback minimizes potential biases and ensures consistent evaluation criteria. Despite its advantages, the adaptation of AI in microteaching requires careful consideration of ethical and practical implications. Issues such as data privacy, algorithmic bias, and digital literacy must be addressed. Collaboration between educational institutions, technology providers, and policymakers is essential to develop effective AI-based microteaching solutions tailored to the Nigerian context.

Keywords: Artificial Intelligence (AI), Classroom Simulations, Microteaching, Real-time Feedback, Teacher Training

Introduction

The rapid evolution of artificial intelligence (AI) has fundamentally transformed educational landscapes globally, with generative AI emerging as a particularly powerful force in revolutionizing teacher education (Chen et al., 2023; Kumar & Singh, 2022). The integration of AI in microteaching represents a significant paradigm shift in how pre-service teachers develop their pedagogical skills, offering unprecedented opportunities for personalized feedback, scenario simulation, and data-driven instructional refinement (Wang et al., 2024; Anderson & Lee, 2023). This transformation is especially critical in Nigerian Colleges of Education, where the imperative to produce technologically competent educators intersects with the challenges of preparing teachers for an increasingly digital educational environment (Okonkwo & Adebayo, 2023).

The advent of generative AI tools like ChatGPT, Claude, and Bard has dramatically expanded the possibilities for enhancing microteaching practices (Zhang & Rodriguez, 2024; Brown et al., 2023). These technologies offer sophisticated capabilities in lesson planning, content generation, and pedagogical strategy development that were previously unimaginable. Unlike traditional microteaching approaches, AI-enhanced systems can provide instant, detailed feedback on teaching performance, generate diverse teaching scenarios that simulate real-world challenges, and offer data-driven insights for continuous improvement (Liu et al., 2023; Thompson, 2022). This technological advancement is particularly significant in the Nigerian context, where the need to bridge the digital divide and prepare teachers for 21st-century classrooms has become increasingly urgent (Adeyemi & Ibrahim, 2024).

The adoption of AI in teacher education, however, extends beyond mere technological integration; it represents a fundamental shift in how we conceptualize teacher preparation (Martinez & Kim, 2023). The Technology Acceptance Model (TAM) provides a crucial framework for understanding this transformation, emphasizing that successful AI integration depends on both perceived usefulness and ease of use among pre-service teachers (Davis & Wilson, 2024; Park et al., 2023). Recent studies have demonstrated that when effectively implemented, AI-enhanced microteaching can significantly improve pedagogical skill development, increase teaching confidence, and foster more innovative instructional approaches (Johnson & Lee, 2024; Rahman et al., 2023). These benefits are particularly relevant for Nigerian Colleges of Education, which must prepare teachers to meet the evolving demands of a rapidly modernizing educational system (Oluwole & Ayodele, 2023).

Moreover, the focus on South-western Nigerian Colleges of Education is strategically significant (Adesina et al., 2024). This region, known for its educational innovation and technological adoption, serves as an ideal testing ground for understanding how AI can be effectively integrated into teacher preparation programs within the Nigerian context (Ogunleye & Fasasi, 2023). The unique combination of traditional pedagogical values and increasing technological accessibility in this region provides valuable insights into the challenges and opportunities of AI adoption in teacher education across developing nations (Hassan & Mohammed, 2024).

The urgency of this research is underscored by several critical factors. First, the global shift towards AI-enhanced education necessitates that Nigerian teacher be adequately prepared to utilize these technologies effectively (Williams & Taylor, 2024; Nwosu et al., 2023). Second, the growing digital divide between developed and developing nations makes it imperative to understand how AI can be adapted to meet local educational needs and constraints (Cooper & Singh, 2023). Finally, the potential of AI to address persistent challenges in teacher education - such as limited resources, inconsistent feedback mechanisms, and the need for standardized teaching quality - makes this research particularly timely and relevant (Yang et al., 2024; Davidson & Roberts, 2023).

This study therefore aims to comprehensively examine how generative AI is being adapted for microteaching in Nigerian Colleges of Education, with particular attention to understanding the factors that influence its adoption, effectiveness, and potential impact on teacher preparation (Edwards & Chen, 2024). By investigating these aspects, this research contributes to the growing body of knowledge on AI in education while providing practical insights for improving teacher

education in Nigeria and similar developing contexts (Mitchell & Kumar, 2023; Adeleke et al., 2024).As generative AI continues to evolve, critical research questions emerge regarding its ethical implementation, potential biases, and comprehensive impact on pedagogical skill development. The intersection of artificial intelligence and teacher education demands rigorous, multidimensional exploration to harness its transformative potential responsibly.

Statement of the Problem:

The integration of generative AI into microteaching practices within Nigerian Colleges of Education represents a critical technological and pedagogical challenge, characterized by significant knowledge gaps in systematic adaptation, implementation, and effectiveness of AI-driven instructional skill development. Current teacher education frameworks lack comprehensive strategies for leveraging advanced technological innovations, thereby constraining the potential for personalized, responsive, and technologically aligned teacher training approaches that could transform pre-service teacher preparation through enhanced feedback mechanisms, standardized skill assessment, and immersive professional learning experiences.

Purpose of the Study

The main purpose of this study was to determine the adaptation of artificial intelligence for micro-teaching in Colleges of Education, South-western Nigeria. Specifically, the study determined:

1. Colleges of Education pre-service teachers perceived usefulness of generative AI for micro-teaching
2. Colleges of Education pre-service teachers perceived ease of use of generative AI for micro-teaching.
3. Colleges of Education pre-service teachers' actual usage of generative AI for micro-teaching.

Research Questions

1. What are the Colleges of Education pre-service teachers perceived usefulness of AI for micro-teaching?

2. What are the Colleges of Education pre-service teachers perceived the ease of use of AI for micro-teaching?

3. What is the actual usage of AI for micro-teaching by Colleges of Education pre-service teachers?

Methodology:

This study employed a sequential explanatory mixed methods design to investigate the integration of generative AI in microteaching practices across Nigerian Colleges of Education. The approach combined quantitative data collection through surveys with qualitative insights from interviews and structured observations. This comprehensive design provided a thorough understanding of AI adaptation in teacher training. The study involved 300 pre-service teachers from 11 Colleges of Education across South-western Nigeria, who participated in the quantitative phase. Additionally, 20 teacher educators were interviewed, and 30 microteaching sessions were observed.

Data collection instruments included a validated questionnaire measuring perceived usefulness, ease of use, and actual usage patterns of generative AI in microteaching. Semi-structured interviews with teacher educators focused on their experiences, perceived benefits and challenges, implementation strategies, and professional development needs. Structured observations of microteaching sessions examined AI tool utilization patterns, teacher-AI interaction, pedagogical effectiveness, student engagement, and technical challenges. Data analysis involved descriptive statistics, mean scores, standard deviations,

Results

Research Question 1: What are the Colleges of Education pre-service teachers perceived usefulness of AI for micro-teaching?

Table 1: Colleges of Education pre-service teachers perceived usefulness of AI for micro-teaching

S/N	Perceived Usefulness	Mean	SD
1	AI is useful to generate effective meaning by sending and receiving signs and symbols in microteaching.	3.10	0.84
2	AI is useful to communicate with lecturers and others in the group in microteaching. | Strongly Agree |	3.28	0.73
3	AI is useful to interpret information received from others in microteaching.	3.33	0.73
4	AI is useful to aid reinforcement in microteaching.	3.40	0.73
5	AI is useful for instructional closure when the lesson is completed, and the teacher shows the link between past knowledge and new knowledge in microteaching.	3.18	0.79
6	AI is useful for cognitive closure when the students have reached closure and have made the link between old and new knowledge in microteaching.	3.17	0.88
7	AI is useful for social closure by easily giving a feeling of achievement after a lesson and encouraging them to continue to strive and make improvements in microteaching.	3.27	0.81
8	AI is useful in establishing a link between what students had known before and what is introduced, moving from old to new materials and linking the two in microteaching.	3.70	0.56
9	AI is useful in establishing a framework to assess the impact and effectiveness of lessons in microteaching.	3.13	0.86
10	AI is useful in giving meaning to a new concept or principle, such as giving examples in microteaching.	3.23	0.87
11	AI is useful to create stimulus in class and vary it in microteaching.	3.25	0.88
12	AI is useful in structuring the use of the board during microteaching.	3.37	0.66
	Average Mean	3.28	

The results indicate that pre-service teachers generally perceive AI as useful in microteaching contexts (overall M = 3.28, SD = 0.66). The highest perceived usefulness was reported for establishing links between prior and new knowledge (Item 8: M = 3.70, SD = 0.56), while the lowest,

though still positive, was for generating effective meaning through signs and symbols (Item 1: M = 3.10, SD = 0.84). Notably, pre-service teachers found AI particularly useful for reinforcement (Item 4: M = 3.40, SD = 0.73) and communicating with lecturers and peers (Item 2: M = 3.28, SD = 0.73). They also perceived AI as beneficial for interpreting information (Item 3: M = 3.33, SD = 0.73) and creating stimuli in class (Item 11: M = 3.25, SD = 0.88). The data suggest that pre-service teachers see potential in AI for various microteaching activities, including instructional closure (Item 5: M = 3.18, SD = 0.79), cognitive closure (Item 6: M = 3.17, SD = 0.88), and social closure (Item 7: M = 3.27, SD = 0.81). Additionally, they perceive AI as useful for structuring board use (Item 12: M = 3.37, SD = 0.66) and assessing lesson effectiveness (Item 9: M = 3.13, SD = 0.86). Overall, the results indicate a positive perception of AI's usefulness in microteaching across various pedagogical aspects, with mean scores consistently above 3.0 on the 4-point scale. This suggests that pre-service teachers generally view AI as a valuable tool for enhancing their microteaching practices.

Research Question 2. What are the Colleges of Education pre-service teachers perceiving the ease of use of AI for micro-teaching?

Table 2. Pre-service teachers perceived ease of use of AI for micro-teaching.

S/N	Perceived Ease of Use	Mean	SD
1	AI is easy to use in generating effective meaning by sending and receiving signs and symbols in microteaching.	3.30	0.77
2	AI is easy to use to communicate with lecturers and others in the group in microteaching.	3.33	0.85
3	AI is easy to use in interpreting information received from others in microteaching.	3.16	0.99
4	AI is easy to use in aiding reinforcement in microteaching.	3.41	0.68
5	AI is easy to use during instructional closure when the lesson is completed, and the teacher shows the link between past knowledge and new knowledge in microteaching.	3.39	0.75
6	AI is easy to use during cognitive closure when the students have reached closure and have made the link between old and new knowledge in microteaching.	3.66	0.55
7	AI is easy to use during social closure by easily giving a feeling of achievement after a lesson and encouraging them to continue to strive and make improvements in microteaching.	3.35	0.61
8	AI is easy to use in establishing a link between what students had known before and what is introduced, moving from old to new materials and linking the two in microteaching.	3.16	0.77
9	AI is easy to use in establishing a framework to assess the impact and effectiveness of a lesson in microteaching.	3.23	0.86
10	AI is easy to use in giving meaning to a new concept or principle, such as giving examples in microteaching.	3.07	0.94
11	AI is easy to use in creating stimulus in class and varying it in microteaching.	3.16	0.88
12	AI is easy to use in structuring the use of the board during microteaching.	3.34	0.69
	Average Mean	3.30	

The results indicate that pre-service teachers generally perceive AI as easy to use in microteaching contexts (overall M = 3.30, SD = 0.69). The highest perceived ease of use was reported for cognitive closure activities (Item 6: M = 3.66, SD = 0.55), suggesting that pre-service teachers find AI particularly user-friendly when helping students link old and new knowledge. Pre-service teachers also found AI easy to use for reinforcement (Item 4: M = 3.41, SD = 0.68) and instructional closure (Item 5: M = 3.39, SD = 0.75). Communication with lecturers and peers was also perceived as relatively easy using AI (Item 2: M = 3.33, SD = 0.85). The data show that pre-service teachers perceive AI as moderately easy to use for various microteaching activities, including social closure (Item 7: M = 3.35, SD = 0.61), structuring board use (Item 12: M = 3.34, SD = 0.69), and generating effective meaning through signs and symbols (Item 1: M = 3.30, SD = 0.77). While still positive, the lowest perceived ease of use was reported for giving meaning to new concepts or principles (Item 10: M = 3.07, SD = 0.94). This suggests that while pre-service teachers generally find AI easy to use, they may experience slightly more difficulty when using it to explain new concepts. Overall, the results indicate a positive perception of AI's ease of use in microteaching across various pedagogical aspects, with mean scores consistently above 3.0 on the 4-point scale. This suggests that pre-service teachers generally view AI as a user-friendly tool for enhancing their microteaching practices, although there is some variation in perceived ease of use across different applications.

Research Question 3. What is the actual usage of AI for micro-teaching by Colleges of Education pre-service teachers?

Table 3: Colleges of Education pre-service teachers' actual usage of AI for micro-teaching .

S/N	Actual Usage	Mean	SD
1	I use AI set induction	3.35	0.74
2	I use AI for introduction	3.14	0.92
3	I use AI for communication	3.27	0.82
4	I use AI stimulus variation	3.35	0.69
5	I use AI reinforcement	3.16	0.89
6	I use AI for closure	3.23	0.78
7	I use AI for use of board	3.24	0.68
	Average Mean	3.25	

The findings reveal a moderate level of AI integration across different teaching activities. On average, these future educators are incorporating AI into their micro-teaching practices with a frequency just above the midpoint of the scale. The overall mean usage across all categories was 3.25, indicating a generally positive inclination towards AI adoption in teaching preparation. Two areas stood out with the highest reported usage: AI for set induction and AI for stimulus variation, both scoring a mean of 3.35. This suggests that pre-service teachers find AI particularly useful in capturing students' attention at the beginning of lessons and in providing diverse stimuli during instruction. Close behind were the use of AI for communication (mean 3.27) and AI for closure activities (mean 3.23), indicating that these future teachers are leveraging AI to enhance their interaction with students and to effectively wrap up their lessons. Slightly lower, but still above the midpoint, were the use of AI for reinforcement (mean 3.16) and AI for introduction (mean 3.14). This implies that while pre-service teachers are utilizing AI in these areas, there might be room for increased adoption or improved AI tools for these specific teaching tasks. The study also mentioned the use of AI for board work, though specific data for this category was not provided in the results. Overall, the consistency in mean scores across categories, ranging from 3.14 to 3.35, suggests that pre-service teachers are integrating AI fairly evenly across various aspects of their micro-teaching practice. The

standard deviations, varying from 0.68 to 0.92, indicate some variability in individual responses, which is expected given the diverse backgrounds and experiences of pre-service teachers. This data provides valuable insight into the current state of AI adoption in teacher education programs, highlighting areas where AI is being embraced and potentially identifying opportunities for further integration and development of AI tools in teacher preparation.

Discussion of Finding

The findings from this study align with the broader literature on the integration of AI in education. Nabeel Gillani et al. (2023) emphasize the potential of AI to enhance various educational processes, including learning analytics and adaptive learning systems. This is also consistent with the idea that AI can provide personalized learning experiences that adapt to individual student needs, as highlighted by the U.S. Department of Education (2023). The findings of Gillani et al., who discuss the role of AI in providing timely feedback and enhancing communication between students and educators. This aligns with the broader educational goal of using AI to support and extend the capabilities of teachers, allowing them to focus more on personalized instruction and less on administrative tasks.

Conclusions

The findings reveal a generally positive attitude among pre-service teachers toward artificial intelligence in microteaching contexts. They perceive AI as a valuable tool that enhances their ability to connect previous knowledge with new concepts, facilitate reinforcement activities, and improve communication with both instructors and fellow students. The pre-service teachers also find AI technology to be user-friendly, particularly when conducting cognitive closure activities, implementing reinforcement strategies, and managing instructional closure.In terms of practical implementation, these teachers have demonstrated a moderate level of AI integration across various teaching activities. They show enthusiasm for using AI in set induction and stimulus variation, though they employ it somewhat less frequently for introductory segments and reinforcement exercises.

Recommendations:

1. Develop comprehensive training programs to increase pre-service teachers' proficiency with AI tools across all aspects of microteaching, particularly in areas with lower perceived ease of use or actual usage.
2. Create targeted initiatives to boost AI usage in areas with lower adoption rates, such as introduction and reinforcement.
3. Use the success in set induction and stimulus variation as models to encourage AI adoption in other areas of microteaching.
4. Collaborate with EdTech companies to create AI tools specifically designed for microteaching tasks, addressing the unique needs of pre-service teachers in the Nigerian context.

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