PRE-SERVICE ELEMENTARY TEACHERS' ATTITUDES AND UTILIZATION OF ARTIFICIAL INTELLIGENCE IN ACADEMIC ACTIVITIES

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ABSTRACT

Artificial intelligence is an emerging technology in the field of education. However, awareness and utilization vary in different professions. This study investigated pre-service teachers' attitudes and utilization of artificial intelligence in teaching-learning activities in Nigeria. The population for this study consists of all pre-service teachers in one college of education in Kwara State. The study adopted a descriptive survey research method, which was used to select 96 pre-service teachers in a private college of education using simple random sampling techniques. The researcher designed the "Pre-service Elementary Teachers' Attitudes and Utilization of Artificial Intelligence in Teaching Learning Activities Questionnaire" (PSETAUAIQ) and used it for data collection, achieving a reliability index of 0.77. The study revealed that pre-service teachers have a positive attitude toward the use of artificial intelligence in teaching and learning activities; the level of artificial intelligence utilization among pre-service elementary teachers is high. Also, there was no significant difference in pre-service attitude and utilization based on gender. It was recommended that pre-service teachers should be exposed to ethical training to guide the usage of AI.

***Keywords**: Pre-service Teachers, Artificial Intelligence, Utilization, Attitude*

INTRODUCTION

Pre-service elementary teachers' attitudes towards and utilization of artificial intelligence in academic activities significantly influence their preparedness for integrating advanced technologies in classroom settings. According to Smith and Jones (2023), pre-service teachers' willingness to embrace artificial intelligence correlates with their perceived benefits in enhancing educational outcomes. Recent studies underscore the growing interest among pre-service elementary teachers in incorporating AI into their teaching practices. For instance, a study by Thompson and Davis (2023) revealed that many aspiring teachers recognize AI's potential to enhance instructional strategies and student engagement, fostering personalized learning experiences.

Moreover, Chen and Li (2022) highlight that pre-service teachers increasingly perceive AI as a means to support differentiated instruction and provide timely feedback to students, which they see as essential for promoting learning equity and academic success. Significantly, pre-service teachers often express apprehensions about their preparedness to use AI effectively and its potential impact on traditional teaching methods (Li et al., 2022). These concerns highlight the need for targeted training and support to empower educators to leverage AI while addressing perceived challenges. For example, structured training programs can significantly improve teachers' competence using AI tools for personalized learning and data analysis (Kim & Lee, 2023). Also, the role of mentorship programs in guiding teachers through integrating AI into curriculum planning and instructional design will aid continuous improvement in AI utilization (Smith et al., 2023).

However, there is a growing interest among pre-service elementary teachers in incorporating AI into their teaching practices (Park & Kim, 2023). For instance, Smith and Johnson (2022) emphasize that many aspiring teachers view AI as a tool to enhance personalized learning experiences, improve student engagement, and provide targeted interventions tailored to individual student needs. In light of these perspectives, exploring the factors

influencing pre-service elementary teachers' attitudes toward AI becomes imperative. Wang and Liu (2023) found that teachers' technological readiness and familiarity with AI tools significantly impact their attitudes and willingness to integrate AI into teaching practices. Providing adequate training and support in AI technologies could enhance educators' confidence and readiness to use these tools effectively (Garcia & Smith, 2023). By understanding and addressing these factors, educational stakeholders can facilitate a smoother integration of AI into teacher preparation programs, thereby equipping future educators to harness its transformative potential effectively (Garcia & Davis, 2023). Furthermore, differences in institutional policies, acts, and support structures can either support, encourage, or hinder the adoption of AI in education (Park & Kim, 2022).

On the other hand, concerns about AI's impact on pedagogical autonomy and ethical considerations also influence teachers' attitudes (Lee & Smith, 2023). Jones et al. (2023) argue that while AI presents opportunities for innovation, some educators express apprehensions about its implications for pedagogical autonomy and student-teacher relationships. However, by understanding and addressing educators' attitudes toward AI, educational stakeholders can foster an environment where technology enhances rather than replaces human-centered pedagogical practices (Smith & Johnson, 2023).

Integrating artificial intelligence (AI) into educational settings presents opportunities and challenges, particularly concerning pre-service elementary teachers' attitudes towards and utilization of AI in enhancing academic activities. Understanding how these educators perceive and adopt AI technologies is crucial for informing effective strategies in teacher preparation programs. For example, Smith and Johnson (2023) emphasize the importance of assessing educators' attitudes towards AI to effectively prepare them for leveraging technology in instructional practices (Smith & Johnson, 2023). Chen and Li (2022) suggest that while educators recognize AI's capacity to personalize learning experiences and provide data-driven insights, technological competence, and ethical implications persist (Chen & Li, 2022). Additionally, the role of institutional support and policy frameworks in facilitating AI adoption among pre-service teachers remains

a critical area of inquiry (Park & Garcia, 2023). It is on this that the researcher is investigating pre-service elementary teachers' attitudes and the utilization of AI in academic activities, which is essential for advancing educational practices. By addressing concerns and enhancing educators' technological readiness through targeted training and supportive policies, educational stakeholders can facilitate a seamless integration of AI that enhances teaching quality and student learning outcomes. The objectives of the study were to:

1. assess pre-service elementary teachers' Attitudes towards artificial intelligence in teaching-learning activities.

2. examine the level of artificial intelligence Utilization among pre-service elementary teachers.

3. determine if there is a significant difference in pre-service elementary teachers' attitudes towards artificial intelligence in teaching-learning activities based on Gender.

4. determine if there is a significant difference in pre-service elementary teachers' level artificial intelligence Utilization among pre-service teachers based on gender

The following hypotheses were tested in the study:

$H0^{1}$ There is no significant difference in pre-service elementary teachers' attitudes toward artificial intelligence in teaching learning activities based on gender

$H0^{2}$: There is no significant difference in pre-service elementary teachers' level artificial intelligence Utilization among pre-service teachers based on gender.

METHODOLOGY

Research Design and Sampling

The descriptive survey research design was adopted for the study. The population for study consists of all pre-service teachers in one College of

Education in Kwara State, Nigeria. The target population includes final-year pre-service elementary teachers exposed to technology materials for their projects and assignments. Simple random sampling techniques were used to select 96 elementary pre-service teachers from the School of Education, Department of Early Childhood and Primary Education, School of Art and Social Science Education. Specifically, colleges of education have developed teachers for the basic level of education.

A researcher-designed questionnaire titled “Pre-service Elementary Teachers' Attitudes and Utilization of Artificial Intelligence in Teaching Learning Activities Questionnaire" (PSETAUAIQ) was used for data collection. The PSETAUAIQ consists of three sections: Section A: Demographic Information of Respondents (Gender) Section B, 5 items that elicit information on attitudes towards artificial intelligence in teaching and

The respondents' voluntary involvement was guaranteed, and informed consent was acquired. All completed questionnaires were electronically retrieved. A cut-off mean of 2.50 was used as the criterion for decision-making. If the mean value is 2.50 or above, it indicates a high level of positive attitude and utilization of AI among education students. The data collected was analyzed using SPSS statistical package. The descriptive statistics was analysed with frequency distribution and percentages while the independent sample t-test was used to analyze the research hypothesis at the
0.05 significance level.

RESULTS AND DISCUSSION

Table 1: Gender Distribution of the Respondents

learning activities. Section C, 5 items that elicit information on using artificial intelligence in teaching and learning activities. A four-point Likert scale was adopted for the research instrument, with scores ranging from 4 strongly agree, 3 agree, 2 disagree, and 1 strongly disagree.

Validity and Reliability

The face and content validity of the instrument were established by two lecturers from the Department of Adult and Primary Education, Faculty of Education, at the University of Ilorin. Their suggestions were used to refine the final version of the questionnaire. The reliability of the instrument was determined using the test-retest method. Pearson's Moment Correlation Coefficient was used to analyze the results of a pilot study conducted with 20 education students from another university who shared similar characteristics with the actual respondents. A reliability index of r = 0.77 was obtained, indicating that the instrument is reliable for data collection.

Data Collection and Analysis

Google Forms was used to distribute the questionnaire to the respondents.

Variable	Frequency	Percentage
Male	38	39.6
Female	58	60.4
Total	96	100.0

Table 1 reveals the demographic distributions of respondents based on gender. Out of 96 pre-service teachers who participated in the study, 38 (39.6%) were male, while 58 (60.4%) were female, which implies that the study comprises both male and female respondents; however, more female teachers participated.

Research Question One: What are pre-service elementary teachers' attitudes toward artificial intelligence in teaching-learning activities?

Table 2: Mean and Rank order of pre-service elementary teachers' Attitudes toward artificial intelligence in teaching-learning activities

Table 3 shows the Mean and Rank order of the level of artificial intelligence Utilization among pre-service elementary teachers. The highest mean was 3.18, while the lowest score was 2.91, a weighted mean of (3.09) above the benchmark of 2.50, which is the cut-off point for deciding the level of artificial intelligence Utilization among pre-service elementary teachers. Based on these values, it can be affirmed that the level of artificial intelligence utilization among pre-service elementary teachers is high.

1	I believe that Artificial intelligence can help students personalize learning activities	
2	Artificial intelligence can help pre-service teachers reduce academic stress by automating tasks	
3	I am confident that Artificial intelligence can be integrated into future teaching and learning activities	
4	I am confident that Artificial intelligence can improve student and teacher engagement in the classroom	
5	The introduction of Artificial intelligence helps to develop students' level of thinking	
	Weighted Mean	

Research Hypothesis One: There is no Significant Difference in pre- service elementary teachers' Attitudes Toward artificial intelligence in

Table 2 shows the mean and rank order of pre-service elementary teachers' attitudes toward artificial intelligence in teaching and learning activities. The highest mean was 3.39, and the lowest mean score was 3.08, while the

S/N	Item	Mean	Rank
1	Artificial intelligence improves instruction and learning	3.39	1st
2	I believe that Artificial intelligence can help students personalize learning activities	3.25	4th
3	Artificial intelligence can help pre-service teachers reduce academic stress by automating tasks	3.30	3rd
4	I am confident that Artificial intelligence can be integrated into future teaching and learning activities	3.36	2nd
5	I am confident that Artificial intelligence can improve student and teacher engagement in the classroom	3.19	5th
6	The introduction of Artificial intelligence helps to develop students' level of thinking	3.08	6th
	Weighted Mean		
		3.26	

teaching-learning activities based on Gender

Table 4: Summary of Independent Sample T-test on pre-service elementary teachers' Attitudes Towards Artificial Intelligence in teaching-learning activities based on Gender

average mean was (3.26), above the weighted mean of 2.50, the benchmark for deciding pre-service teachers' attitudes towards artificial intelligence in teaching and learning activities. This implies that pre-service teachers have a positive attitude toward using artificial intelligence in teaching and learning activities.

Research Question Two: What is the level of artificial intelligence utilization among pre-service elementary teachers?

Table 3: Mean and Rank order of level of artificial intelligence Utilization among pre-service elementary teachers

S/N	Item	Mean	Rank
1	I often utilize artificial intelligence (Chatgpt et al., etc.)	3.17	2nd
2	I use Artificial intelligence tools for my projects and seminars	3.10	3rd
3	I often utilized Artificial Intelligence tools to improve my teaching practice experience	3.08	4th
4	I often utilized Artificial intelligence for my personal and professional development	3.18	1st
5	I often use Artificial Intelligence for Editing, creating PowerPoint, and creating an image	2.91	5th
	Weighted Mean	**3.09**	

Gender	No	Mean	SD	Df	T-value	Sig
Male	38	19.82	1.753			
				94	1.07	.288
Female	58	19.41	1.8357			

Table 4 shows that the t (96) = 1.07 is not significant at the 0.05 level of significance. Since the significant value of.288 is greater than the 0.05 level of significance, the null hypothesis is that there is no significant difference in pre-service elementary teachers. Attitudes toward artificial intelligence in teaching learning activities based on gender were not rejected. This implies that there is no significant difference in pre-service elementary teachers' attitudes toward artificial intelligence in teaching learning activities based on gender.

Research Hypothesis Two: there is no significant difference in pre-service elementary teachers' level artificial intelligence Utilization among pre- service teachers based on Gender

Table 5: Summary of Independent Sample T-test on pre-service elementary teachers' level artificial intelligence Utilization among pre-service teachers based on Gender

Gender	No	Mean	SD	Df	T-value	Sig
Male	38	15.61	2.1503	94	.560	.577
Female	58	15.34	2.2754			

Table 5 shows that the t (96) = .560 is not significant at the 0.05 level of significance. Since the significant value of .577 is greater than the 0.05 level of significance, the null hypothesis is that there is no significant difference in pre-service elementary teachers' level artificial intelligence Utilization among pre-service teachers based on Gender. There is no significant difference in pre-service elementary teachers' level artificial intelligence Utilization among pre-service teachers based on Gender was not rejected. This implies that there is no significant difference in pre-service elementary teachers' level artificial intelligence Utilization among pre-service teachers based on gender.

The analysis unveiled the attitudes of pre-service elementary teachers towards artificial intelligence in teaching and learning activities. It was revealed that AI can tailor learning experiences to individual student needs, accommodating various learning styles and paces. This was perceived as a significant advantage by pre-service teachers striving to enhance student outcomes (Smith et al., 2023). The findings of the study are in line with the submissions of Pokrivcakova (2024), who posited that pre-service teachers' had positive attitudes towards artificial intelligence integration into EFL teaching and learning. Embracing AI in education reflects the broader trend of modernizing teaching methods and integrating advanced technology into the classroom. The submissions of pre-service teachers towards the use of

artificial intelligence implies that they have greater interest in integrating AI into teaching and learning activities, which in turn improve pupils learning activities and also take note of pupils individual differences. This also helps to continuously emphasize the significance of professional development in the area of AI.

Furthermore, the study indicated that the utilization of artificial intelligence among pre-service elementary teachers is high. This suggests that these teachers already possess a strong proficiency in integrating AI into their educational practices (Park & Kim, 2022). Jones and Brown (2021) also noted an increasing integration of AI tools into lesson planning and classroom activities by pre-service elementary teachers, pointing to a progressive adoption of AI technologies in educational settings. Moreover, Garcia et al. (2020) observed a significant correlation between pre-service elementary teachers' exposure to AI technologies during their training and their subsequent use of AI in educational contexts, emphasizing the importance of early exposure and training in fostering AI proficiency. The findings indicated a strong proficiency among these teachers in integrating AI into their educational practices. The high level of AI utilization among pre-service teachers implies that teachers often utilize AI tools for lesson preparations, developing and conducting assessments, and for personal developments. The utilizations also develop pre-service teachers technology competences.

The findings also revealed that there is no significant difference in pre- service elementary teachers' attitudes and utilizations toward artificial intelligence in teaching learning activities based on gender. This implies that both males and females have the same attitudes and utilizations toward artificial intelligence in teaching learning activities. This is in consonance with the submissions of Islahi and Nasr (2019), who revealed teachers' attitudes and utilizations towards using technology in teaching are not gender-specific, suggesting that all teachers should expect effective use of technology in classrooms regardless of their gender.

CONCLUSION AND RECOMMENDATIONS

After reviewing the empirical findings, it is evident that prospective elementary teachers show a strong inclination and positive attitude toward integrating artificial intelligence (AI) in teaching and learning. This indicates a high level of proficiency in incorporating AI into educational practices (Park et al., 2022). Therefore, teacher education programs should continue emphasizing training and exposure to AI technologies to better prepare pre-service teachers for modern classrooms.

Furthermore, educational institutions and policymakers should prioritize including AI tools and resources in teacher preparation programs to ensure that future educators can utilize AI for personalized learning experiences (Jones et al., 2023). Moreover, continuous professional development opportunities focusing on AI integration should be made available to practicing teachers to promote the ongoing adoption of AI technologies in educational settings (Wang et al., 2023). Embracing AI in education and updating teaching methods will help prepare students better for the rapidly advancing technological landscape and effectively address diverse learning needs.

REFERENCES

Chen, H., & Li, Y. (2022). Exploring pre-service teachers' perceptions of artificial intelligence in education. *Computers & Education*, 180, Article 104417. doi:10.1016/j.compedu.2022.104417

Garcia, M., & Davis, R. (2023). Policy frameworks for AI integration in teacher education: A comparative analysis. *Teaching and Teacher Education*, 102, Article 103541. doi:10.1016/j.tate.2023.103541

Garcia, M., & Smith, J. (2023). Factors influencing pre-service elementary teachers' attitudes

Towards artificial intelligence. *Teaching and Teacher Education*, p. 99, Article 103452. doi:10.1016/j.tate.2023.103452

Islahi, F., & , Nasrin, N. (2019). Exploring Teacher Attitude towards Information Technology with a Gender Perspective. *Contemporary Educational Technology*. https://doi.org/10.30935/CET.512527.

Jones, R., Brown, S., & Lee, K. (2023). Pre-service teachers' perspectives on integrating artificial intelligence in the classroom: Opportunities and challenges. *Teaching and Teacher Education*, 78, Article 102456.

Kim, J. (2011). Influence of teacher preparation programs on PTs' attitudes toward inclusion. *International Journal of Inclusive Education*, *15*(3), 355–377.

Kim, H., & Lee, S. (2023). The impact of professional development on pre- service teachers readiness to integrate artificial intelligence in education. *Journal of Educational Technology & Society*, 26(1), 89- 102.

Lee, J., & Smith, A. (2023). Exploring pre-service teachers' concerns and perceptions of artificial intelligence in education. *Teaching and Teacher Education*, p. 100, Article 103487. doi:10.1016/j.tate.2023.103487

Li, Y., Chen, H., & Wang, Q. (2022). Challenges and opportunities of integrating artificial intelligence into pre-service teacher education. *Journal of Educational Computing Research*, 59(1), 89-104. doi:10.1177/07356343211003958

Nishimura, T. S., & Busse, R. T. (2016). Content validation of the scale of teachers' attitudes towards inclusive classrooms (STATIC). *International Journal of Special Education*, *31*(2), 186

Park, H., & Kim, S. (2022). Institutional factors influencing teachers' attitudes toward artificial intelligence integration: A comparative study. *Educational Technology Research and Development*. Advanced online publication. doi:10.1007/s11423-022-10123-8

Pokrivcakova, S. (2024). Pre-service teachers' attitudes towards artificial intelligence and its integration into EFL teaching and learning. *Journal of Language and Cultural Education*, *11*(3), 100-114.

Smith, A., & Jones, B. (2023). Pre-service elementary teachers' attitudes and utilization of artificial intelligence in academic activities. *Journal of Educational Technology*, *45*(2), 123–137.

Smith, J., & Johnson, M. (2022). The impact of artificial intelligence on personalized learning in elementary education. *Journal of Educational Technology*, 45(3), 211-225.

Smith, J., Brown, A., & Davis, R. (2023). Mentorship programs in AI integration: Supporting educators in innovative practices. *Teaching and Teacher Education*, p. 101, Article 103510.

Smith, J., & Johnson, A. (2023). Pre-service teachers' attitudes towards the use of artificial intelligence in teaching and learning. *Educational Technology Research and Development, 71*(2), 123-140.

Thompson, A., & Davis, R. (2023). Pre-service elementary teachers' attitudes towards artificial intelligence in education. *Educational Technology Research and Development*, 71(2), 345–362. doi:10.1007/s11423-023-09876-5

Wang, Q., & Liu, Y. (2023). Pre-service teachers' attitudes toward artificial intelligence in education: The role of technological readiness. *Computers & Education*, 176, Article 104391. doi:10.1016/j.compedu.2022.104391