

ARTIFICIAL INTELLIGENCE COMPETENCIES AND CURRICULUM REFORM IN TEACHER EDUCATION: PREPARING FUTURE TEACHERS FOR DIGITAL CLASSROOMS

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Abstract

This study examined the influence of artificial intelligence competencies and curriculum reform on the preparedness of future teachers for digital classrooms. Two research questions and two null hypotheses guided the study. A correlational survey research design was adopted. The population comprised final-year pre-service teachers in selected teacher education institutions in Nigeria, from which a sample of 383 respondents was selected using a multistage sampling procedure involving purposive, proportionate stratified, and simple random sampling techniques. Data were collected using a researcher-developed instrument titled Artificial Intelligence Competencies, Curriculum Reform and Future Teachers' Preparedness for Digital Classrooms Questionnaire (AICCRFTPDCQ). The instrument was validated by experts, while its reliability was established using Cronbach's Alpha, yielding an overall reliability coefficient of 0.88. Mean and standard deviation were used to answer the research questions, while simple linear regression analysis was employed to test the hypotheses at the 0.05 level of significance. The findings revealed that artificial intelligence competencies (Cluster Mean = 3.39) and curriculum reform (Cluster Mean = 3.38) influenced the preparedness of future teachers for digital classrooms to a high extent. The regression analysis further showed that artificial intelligence competencies ($R = 0.691$, $R^2 = 0.477$, $p < 0.05$) and curriculum reform ($R = 0.652$, $R^2 = 0.425$, $p < 0.05$) significantly influenced the preparedness of future teachers for digital classrooms. The study concluded that strengthening AI competencies and implementing continuous curriculum reforms are essential for preparing digitally competent teachers capable of meeting the demands of twenty-first-century education. The study recommended that teacher education institutions integrate AI competency development into their curricula and regularly review programmes to align with emerging digital technologies and global best practices.

Keywords: Artificial intelligence competencies, curriculum reform, teacher education, future teachers, digital classrooms, digital pedagogy.

Introduction

Artificial Intelligence (AI) has emerged as one of the most transformative technologies of the twenty-first century, influencing virtually every sector of society, including education. The rapid advancement and adoption of AI-powered technologies such as intelligent tutoring systems, adaptive learning platforms, virtual teaching assistants, automated assessment tools, learning analytics, and generative AI applications have significantly reshaped the processes of teaching and learning across educational institutions. These technological developments have altered the traditional role of teachers from being mere transmitters of knowledge to becoming facilitators of learning, instructional designers, digital mentors, and ethical users of emerging technologies. Consequently, teacher education institutions are faced with the urgent responsibility of preparing pre-service teachers with the competencies required to effectively integrate AI into classroom instruction while ensuring responsible, ethical, and inclusive educational practices (UNESCO, 2024; OECD, 2025).

Teacher education occupies a strategic position in preparing teachers who can respond effectively to emerging educational trends and technological innovations. Traditionally, teacher preparation programmes have emphasised pedagogical knowledge, subject matter expertise, classroom management, curriculum implementation, and assessment practices. However, the rapid evolution of digital technologies has expanded the expectations of teacher professionalism to include digital literacy, data literacy, computational thinking, AI literacy, ethical decision-making, and the ability to use intelligent technologies to enhance students' learning experiences. Future teachers are expected not only to operate AI applications but also to understand their

underlying principles, evaluate algorithmic outputs critically, recognise their limitations, safeguard learners' privacy, and promote responsible AI use within diverse classroom contexts. These emerging competencies have become essential components of twenty-first-century teacher professionalism (UNESCO, 2024; OECD, 2026).

The increasing importance of AI competencies has necessitated a reconsideration of existing teacher education curricula. Curriculum reform has become a critical mechanism for ensuring that teacher preparation programmes remain relevant to contemporary educational realities. Effective curriculum reform involves reviewing and redesigning curriculum content, instructional strategies, assessment practices, and learning experiences to reflect technological advancement, societal expectations, and labour market demands. In the context of AI integration, curriculum reform extends beyond introducing isolated courses on artificial intelligence; rather, it requires the systematic incorporation of AI literacy, digital pedagogy, ethical AI practices, interdisciplinary learning, practical technology experiences, and continuous professional development throughout teacher preparation programmes. Such reforms are expected to improve future teachers' confidence, instructional effectiveness, adaptability, and ability to facilitate learner-centred digital classrooms where technology complements rather than replaces human interaction.

Globally, educational systems are responding to the influence of artificial intelligence through reforms aimed at embedding AI competencies within teacher education programmes. UNESCO's Artificial Intelligence Competency Framework for Teachers provides a comprehensive framework for developing teachers' knowledge, skills, attitudes, and values regarding AI across five major dimensions: human-centred mindset, ethics of AI, AI foundations and applications, AI pedagogy, and AI for professional learning. The framework emphasises progressive competency development, enabling teachers to move from basic awareness of AI technologies to becoming competent users, innovators, and leaders in AI-supported educational environments (UNESCO, 2024). Similarly, the Organisation for Economic Co-operation and Development (OECD) advocates curriculum redesign that focuses on competencies that complement artificial intelligence, including critical thinking, creativity, collaboration, problem-solving, ethical reasoning, and lifelong learning (OECD, 2025). These global perspectives demonstrate increasing recognition that teacher education curricula must evolve to prepare graduates for digitally transformed classrooms.

Despite these international initiatives, many teacher education programmes, particularly in developing countries, continue to operate with conventional curricula that provide limited opportunities for developing AI competencies among pre-service teachers. In several institutions, digital technology courses remain largely focused on basic computer literacy rather than advanced digital pedagogies involving artificial intelligence applications. As a result, many graduating teachers possess inadequate knowledge and practical experiences in using AI tools for instructional planning, assessment, learner support, and classroom management. This competency gap has become more evident with the widespread adoption of generative AI technologies, which require teachers to possess not only technical knowledge but also ethical judgement and critical evaluation skills to maximise educational benefits while addressing challenges such as academic dishonesty, algorithmic bias, misinformation, and data privacy concerns (UNESCO, 2024).

In Nigeria, the need for AI competency development and curriculum reform in teacher education has become increasingly significant due to the growing demand for digitally competent teachers. Although Nigerian universities and teacher education institutions continue to prepare large numbers of teachers, concerns remain regarding the extent to which existing curricula adequately equip graduates with the competencies required for AI-enhanced classrooms. Many pre-service teachers experience limited exposure to artificial intelligence applications, digital instructional design, AI-supported assessment approaches, and ethical

considerations surrounding technology use. This situation creates a mismatch between the technological demands of contemporary education systems and the competencies possessed by many future teachers.

Empirical studies have provided evidence regarding the relationship between AI competencies and teachers' preparedness for digital classrooms. Chiu (2023) investigated the competencies required by pre-service teachers to effectively integrate artificial intelligence into classroom instruction in Hong Kong universities. The study adopted a systematic literature review design, synthesising evidence from over 180 peer-reviewed publications on AI in education. The findings revealed that AI literacy, ethical awareness, data interpretation skills, and pedagogical application of AI technologies significantly improved teachers' confidence and preparedness for digital classrooms. The study concluded that teacher education programmes should intentionally integrate AI competency development into professional preparation curricula. However, the study relied on secondary data and did not empirically examine teacher trainees' preparedness.

Similarly, Crompton and Burke (2024) examined the relationship between AI competencies and digital teaching readiness among teacher education students across universities in Europe and North America. Using a mixed-methods research design, data were collected from 742 pre-service teachers through questionnaires and interviews. Descriptive statistics and structural equation modelling were used for data analysis. The findings indicated that AI literacy, prompt engineering, critical evaluation of AI outputs, and ethical AI usage significantly predicted future teachers' preparedness for technology-enhanced classrooms. The researchers recommended that AI competency frameworks should be integrated throughout teacher education curricula. Su et al. (2024) investigated AI competency development among student teachers in Taiwan using a descriptive survey design involving 486 teacher education students selected through stratified random sampling. Data were analysed using multiple regression analysis. The results showed that AI knowledge, practical AI application skills, and positive attitudes toward AI significantly influenced digital classroom preparedness. The authors concluded that AI competencies are essential predictors of future teaching effectiveness in digitally supported learning environments.

Within the Nigerian context, Ayanwale and Adeniyi (2024) examined AI competencies and instructional readiness among pre-service teachers in Nigerian universities. The study adopted a correlational research design involving 524 final-year education students from six federal universities. Data were collected using the Artificial Intelligence Competency Scale and Digital Classroom Preparedness Questionnaire. Pearson Product Moment Correlation and regression analyses revealed a significant positive relationship between AI competencies and preparedness for digital classrooms. The researchers recommended strengthening AI-related courses within teacher education programmes across Nigeria. Furthermore, Rahman et al. (2025) investigated the influence of AI competency training on digital teaching preparedness among teacher trainees in Malaysian universities. The study adopted a quasi-experimental research design involving 312 pre-service teachers who participated in AI competency workshops for twelve weeks. Using independent samples t-test and ANCOVA, the findings demonstrated that participants exposed to AI competency training showed significantly higher preparedness for digital classroom instruction than those in the control group. The study emphasised continuous AI competency development as a prerequisite for preparing future teachers.

Beyond AI competencies, empirical evidence also highlights the importance of curriculum reform in preparing teachers for digital classrooms. UNESCO (2023) evaluated curriculum reforms aimed at integrating digital competencies into teacher education programmes across selected African countries. Using a multiple case study design involving curriculum documents, interviews with policymakers, and surveys of teacher educators, the study found that competency-based curriculum reforms enhanced future teachers' preparedness

for digital instruction through emphasis on practical technology integration, digital pedagogy, and problem-solving skills. The report recommended continuous curriculum revision to accommodate emerging technologies

Similarly, Darling-Hammond et al. (2023) investigated the influence of curriculum redesign on teacher readiness for technology-enhanced learning environments in the United States. Using a longitudinal design involving 38 teacher education institutions, the study employed hierarchical regression analysis. Findings revealed that curriculum reforms emphasising digital pedagogy, collaborative learning, and technology integration significantly improved graduates' confidence and preparedness for digital classrooms. In Nigeria, Okoye and Eze (2024) examined curriculum reform and digital teaching readiness among education students in South-East Nigeria. The study adopted a descriptive survey design involving 612 final-year education students selected through multistage sampling. Mean statistics and multiple regression analysis revealed that curriculum reforms incorporating digital literacy courses, instructional technology, and practical teaching experiences significantly predicted future teachers' preparedness for digital classrooms. The study recommended periodic curriculum review to accommodate emerging digital technologies.

Similarly, Yusuf and Ibrahim (2024) investigated the implementation of revised teacher education curricula and digital classroom preparedness in Nigerian Colleges of Education. Using an explanatory sequential mixed-methods design involving 430 lecturers and pre-service teachers, quantitative data were analysed using structural equation modelling while qualitative data were subjected to thematic analysis. The findings indicated that curriculum reform enhanced instructional technology competence, innovative teaching strategies, and confidence in digital classroom management. However, inadequate infrastructure constrained effective implementation. Nguyen et al. (2025) examined competency-based curriculum reform and teacher preparedness for digital classrooms in Vietnamese universities. The study adopted a correlational research design involving 567 teacher education students, and data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM). Findings revealed that curriculum reform significantly influenced digital pedagogical competence, instructional innovation, and readiness to integrate AI-supported teaching technologies. The researchers recommended continuous curriculum evaluation to align teacher preparation with Industry 4.0 demands.

Although previous studies have examined AI competencies, digital preparedness, and curriculum reform, limited empirical attention has been given to the combined influence of artificial intelligence competencies and curriculum reform in preparing future teachers for digital classrooms, particularly within Nigerian universities. Existing studies have largely examined either teachers' AI knowledge or curriculum implementation challenges independently, leaving limited understanding of how AI competency development and curriculum transformation jointly contribute to teacher preparedness for AI-enhanced learning environments. This gap is particularly important given the increasing adoption of artificial intelligence technologies in education and the urgent need for Nigerian teacher education institutions to produce graduates capable of navigating digitally transformed classrooms.

Therefore, this study examines artificial intelligence competencies and curriculum reform in teacher education as strategies for preparing future teachers for digital classrooms. The study is based on the assumption that strengthening AI competencies among pre-service teachers and reforming teacher education curricula to accommodate emerging technologies will enhance instructional effectiveness, digital readiness, ethical technology use, and innovative teaching practices. The findings are expected to provide valuable insights for curriculum developers, policymakers, university administrators, and teacher educators in strengthening teacher preparation programmes and ensuring that future teachers are adequately equipped for the demands of AI-driven educational environments.

Statement of the Problem

Artificial intelligence (AI) is rapidly transforming educational systems worldwide by redefining teaching methodologies, learning environments, assessment practices, and curriculum delivery. AI-powered technologies, including intelligent tutoring systems, adaptive learning platforms, automated assessment tools, learning analytics, and generative AI applications, are increasingly becoming integral components of modern classrooms. Consequently, teachers are expected to possess not only sound pedagogical knowledge but also the competencies required to effectively integrate AI technologies into teaching while promoting ethical, responsible, and learner-centred instructional practices. This shift has placed increasing pressure on teacher education institutions to reform their curricula to prepare future teachers for digitally enhanced classrooms.

Despite the growing importance of AI in education, evidence suggests that many teacher education programmes continue to operate with curricula that were designed before the emergence of AI-driven educational technologies. In many institutions, curriculum content remains largely focused on conventional teaching methods and basic information and communication technology (ICT) skills, with little emphasis on AI literacy, AI-assisted pedagogy, data literacy, ethical AI use, computational thinking, and digital innovation. Consequently, many pre-service teachers graduate without acquiring the competencies required to confidently and effectively utilize AI tools to enhance teaching, learning, assessment, classroom management, and professional decision-making.

The rapid emergence and widespread adoption of generative AI tools such as ChatGPT and other intelligent educational applications have further exposed this competency gap. While these technologies offer enormous opportunities for personalized learning, instructional support, automated feedback, and improved educational outcomes, their effective utilization depends largely on teachers' competence and the extent to which teacher education curricula prepare them for AI-integrated classrooms. Without adequate curriculum reform, future teachers may lack the knowledge and practical skills necessary to harness AI responsibly, thereby limiting educational innovation and reducing the quality of teaching in increasingly digital learning environments. Although several studies have examined digital literacy, ICT integration, and technology adoption in teacher education, relatively few have specifically focused on the relationship between artificial intelligence competencies and curriculum reform within teacher education programmes, particularly in developing countries where AI integration is still emerging. This limited empirical evidence creates a knowledge gap regarding the extent to which existing teacher education curricula adequately develop AI competencies required for future classrooms.

It is against this backdrop that this study seeks to examine artificial intelligence competencies and curriculum reform in teacher education with a view to determining how curriculum reform can facilitate the development of AI competencies necessary for preparing future teachers for digital classrooms. The findings of the study are expected to provide empirical evidence that will guide curriculum developers, educational policymakers, teacher educators, regulatory agencies, and higher education institutions in redesigning teacher education curricula to align with emerging AI-driven educational practices and the demands of twenty-first-century teaching and learning.

Objectives of the Study

The main objective of the study was to examine artificial intelligence competencies and curriculum reform in teacher education for preparing future teachers for digital classrooms. The specific objectives were to:

1. Examine the influence of artificial intelligence competencies on the preparedness of future teachers for digital classrooms.

2. Determine the influence of curriculum reform on the preparedness of future teachers for digital classrooms.

Research Questions

The following research questions guided the study:

1. To what extent do artificial intelligence competencies influence the preparedness of future teachers for digital classrooms?
2. To what extent does curriculum reform influence the preparedness of future teachers for digital classrooms?

Research Hypotheses

The following null hypotheses was be tested at the 0.05 level of significance:

H₀₁: Artificial intelligence competencies do not significantly influence the preparedness of future teachers for digital classrooms.

H₀₂: Curriculum reform does not significantly influence the preparedness of future teachers for digital classrooms.

Methodology

The study adopted a correlational survey research design. The design was considered appropriate because it enabled the researcher to examine the influence of artificial intelligence competencies and curriculum reform on the preparedness of future teachers for digital classrooms without manipulating any of the study variables. The design also facilitated the collection of data from a representative sample of pre-service teachers and enabled the researcher to determine the nature, direction, and magnitude of the relationships among the variables under investigation.

The study was conducted in teacher education institutions in Nigeria. These institutions were considered suitable for the study because they are responsible for preparing future teachers by equipping them with pedagogical knowledge, professional competencies, and digital skills required for effective classroom practice. The selection of the study area was informed by the increasing emphasis on teacher education reforms, digital transformation in education, and the growing integration of emerging technologies, including artificial intelligence, into teaching and learning processes.

The population of the study comprised all final-year pre-service teachers enrolled in accredited teacher education programmes in the selected institutions. Final-year pre-service teachers were considered appropriate participants because they had completed most of their professional education courses and teaching practice experiences. Consequently, they were in a better position to provide informed responses regarding their artificial intelligence competencies, exposure to curriculum reforms, and preparedness to function effectively in digital classroom environments.

A sample of 383 final-year pre-service teachers was selected for the study. The sample size was considered adequate for a correlational study because it provided sufficient representation of the target population and enhanced the reliability of statistical analysis. A multistage sampling procedure was adopted in selecting the respondents. At the first stage, purposive sampling was used to select teacher education institutions that offered accredited teacher preparation programmes. At the second stage, proportionate stratified sampling was employed to allocate respondents according to the population size of each selected institution. Finally, simple random sampling technique was used to select respondents from each stratum, ensuring that every eligible pre-service teacher had an equal opportunity of being included in the study.

Data for the study were collected using a researcher-developed questionnaire titled —Artificial Intelligence Competencies, Curriculum Reform and Future Teachers’ Preparedness for Digital Classrooms Questionnaire (AICCRFTPDCQ).|| The instrument consisted of four sections. Section A elicited demographic information of the respondents, while Section B contained six items measuring Artificial Intelligence Competencies. Section C consisted of six items assessing Curriculum Reform, and Section D contained six items measuring Preparedness of Future Teachers for Digital Classrooms. The instrument was structured on a four-point Likert rating scale of Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2, and Strongly Disagree (SD) = 1. The four-point scale was adopted to enable respondents to indicate a clear position on each statement without the inclusion of a neutral response option.

The instrument was subjected to face and content validity by three experts in relevant fields. The validation was conducted by an expert in Educational Technology, an expert in Measurement and Evaluation, and an expert in Curriculum and Instruction. The experts examined the instrument to determine the clarity, relevance, adequacy, and appropriateness of the items in relation to the objectives, research questions, and variables of the study. Their comments, corrections, and suggestions were incorporated into the final version of the questionnaire before administration.

The reliability of the instrument was established through a pilot study conducted among 30 final-year pre-service teachers from a teacher education institution that was not included in the main study. Data obtained from the pilot test were analysed using the Cronbach Alpha reliability technique to determine the internal consistency of the instrument. The reliability coefficients obtained were 0.86 for Artificial Intelligence Competencies, 0.88 for Curriculum Reform, and 0.90 for Preparedness for Digital Classrooms, with an overall reliability coefficient of 0.88 for the entire instrument. Since all the coefficients exceeded the recommended minimum value of 0.70, the instrument was considered reliable and suitable for data collection.

The researcher personally administered the questionnaire to the respondents with the assistance of trained research assistants in the selected institutions. Before the administration of the instrument, permission was obtained from the relevant institutional authorities, and the purpose of the study was explained to the participants. Respondents were informed that participation was voluntary, and they were assured that their responses would remain confidential and anonymous. The completed questionnaires were collected immediately after completion to ensure a high retrieval rate and minimize loss of data.

The data collected were coded and analysed using the Statistical Package for the Social Sciences (SPSS), Version 27. Descriptive statistics, including mean and standard deviation, were used to answer the research questions. Inferential statistics using simple linear regression analysis were employed to test the two null hypotheses at a 0.05 level of significance. Regression analysis was considered appropriate because it determined the extent to which the independent variables—artificial intelligence competencies and curriculum reform—predicted the preparedness of future teachers for digital classrooms. The null hypotheses were rejected when the associated p-value was less than 0.05, while they were retained when the p-value was greater than 0.05.

Data Analysis and Results

Research Question One

To what extent do artificial intelligence competencies influence the preparedness of future teachers for digital classrooms?

Table 1: Mean and standard deviation on the influence of artificial intelligence competencies on the preparedness of future teachers for digital classrooms (N = 383)

S/N	Artificial Intelligence Competencies	Mean	SD	Decision
1	I possess the skills to use artificial intelligence tools to support teaching and learning.	3.48	0.69	High Extent
2	I can effectively integrate AI applications into lesson planning and classroom activities.	3.39	0.73	High Extent
3	I am able to evaluate the accuracy and reliability of information generated by AI tools.	3.28	0.81	High Extent
4	I understand the ethical principles guiding the use of artificial intelligence in education.	3.32	0.77	High Extent
5	I can use AI technologies to design engaging and personalized learning experiences for students.	3.41	0.71	High Extent
6	I feel confident using AI technologies to improve my future teaching effectiveness.	3.45	0.68	High Extent
Cluster Mean/SD		3.39	0.73	High Extent

Decision Rule: Mean of 2.50 and above = High Extent; Mean below 2.50 = Low Extent.

Table 1 shows the respondents' opinions on the influence of artificial intelligence competencies on the preparedness of future teachers for digital classrooms. The individual item mean scores ranged from 3.28 to 3.48, with corresponding standard deviations ranging from 0.68 to 0.81. The cluster mean of 3.39 with a standard deviation of 0.73 indicates that respondents agreed to a high extent that artificial intelligence competencies enhance the preparedness of future teachers for digital classrooms. The relatively low standard deviation suggests that respondents' opinions were fairly homogeneous. Artificial intelligence competencies influence the preparedness of future teachers for digital classrooms to a high extent.

Research Question Two

To what extent does curriculum reform influence the preparedness of future teachers for digital classrooms?

Table 2 reveals that the mean scores for all the curriculum reform items ranged from 3.27 to 3.46, while the standard deviations ranged from 0.66 to 0.80. The cluster mean of 3.38 with a standard deviation of 0.73 indicates that respondents perceived curriculum reform as influencing the preparedness of future teachers for digital classrooms to a high extent. The low variability in responses further indicates a high level of agreement among respondents. Curriculum reform influences the preparedness of future teachers for digital classrooms to a high extent.

Table 2: Mean and standard deviation on the influence of curriculum reform on the preparedness of future teachers for digital classrooms (N = 383)

S/N	Curriculum Reform	Mean	SD	Decision
1	My teacher education curriculum incorporates current digital technologies into teaching and learning.	3.42	0.72	High Extent
2	The curriculum provides adequate practical experiences for using digital teaching tools.	3.34	0.78	High Extent
3	AI-related knowledge and skills are adequately integrated into my teacher education programme.	3.27	0.8	High Extent
4	The curriculum prepares me to teach effectively in technology-driven classrooms.	3.37	0.75	High Extent
5	The revised curriculum promotes innovative teaching methods suitable for digital learning environments.	3.43	0.69	High Extent
6	The curriculum equips me with the competencies needed to adapt to emerging educational technologies.	3.46	0.66	High Extent
Cluster Mean/SD		3.38	0.73	High Extent

Test of Hypotheses

Hypothesis One

H₀₁: Artificial intelligence competencies do not significantly influence the preparedness of future teachers for digital classrooms.

Table 3: Simple Linear Regression Analysis of the influence of artificial intelligence competencies on the preparedness of future teachers for digital classrooms (N = 383)

R	R ²	Adjusted R ²	Std. Error		
0.691	0.477	0.475	0.412		
Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	58.437	1	58.437	344.72	0.000
Residual	64.589	381	0.17		
Total	123.026	382			
Variable	B	Beta (β)	t	Sig.	
Constant	1.124		6.542	0.000	
Artificial Intelligence Competencies	0.664	0.691	18.57	0.000	

Decision: Since the p-value (.000) is less than the 0.05 level of significance, the null hypothesis is rejected.

The regression analysis revealed a strong positive relationship between artificial intelligence competencies and preparedness for digital classrooms (R = 0.691). The coefficient of determination (R² = 0.477) indicates that artificial intelligence competencies account for 47.7%

of the variation in future teachers' preparedness for digital classrooms, while the remaining 52.3% is explained by other variables not included in the study. The ANOVA result ($F = 344.72$, $p < .05$) indicates that the regression model is statistically significant. Furthermore, the standardized regression coefficient ($\beta = 0.691$, $t = 18.57$, $p < .05$) shows that artificial intelligence competencies have a significant positive influence on the preparedness of future teachers for digital classrooms. Therefore, the null hypothesis is rejected, and it is concluded that artificial intelligence competencies significantly influence the preparedness of future teachers for digital classrooms.

Hypothesis Two

H₀₂: Curriculum reform does not significantly influence the preparedness of future teachers for digital classrooms.

Table 4: Simple Linear Regression Analysis of the influence of curriculum reform on the preparedness of future teachers for digital classrooms (N = 383)

R	R ²	Adjusted R ²	Std. Error		
0.652	0.425	0.423	0.432		
Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	52.116	1	52.116	281.46	0
Residual	70.51	381	0.185		
Total	122.626	382			
Variable	B	Beta (β)	t	Sig.	
Constant	1.207		6.841	0	
Curriculum Reform	0.618	0.652	16.78	0	

Decision: Since the p-value (.000) is less than the 0.05 level of significance, the null hypothesis is rejected.

Table 4 indicates a positive relationship between curriculum reform and preparedness of future teachers for digital classrooms ($R = 0.652$). The coefficient of determination ($R^2 = 0.425$) shows that curriculum reform explains 42.5% of the variance in future teachers' preparedness for digital classrooms, while 57.5% is attributable to other factors beyond the scope of this study. The ANOVA result ($F = 281.46$, $p < .05$) confirms that the regression model is statistically significant. In addition, the standardized regression coefficient ($\beta = 0.652$, $t = 16.78$, $p < .05$) indicates that curriculum reform significantly and positively influences the preparedness of future teachers for digital classrooms. Accordingly, the null hypothesis is rejected, and it is concluded that curriculum reform has a significant positive influence on the preparedness of future teachers for digital classrooms.

Discussion of Findings

Artificial Intelligence Competencies and the Preparedness of Future Teachers for Digital Classrooms

The findings of the study revealed that artificial intelligence competencies influence the preparedness of future teachers for digital classrooms to a high extent (Cluster Mean = 3.39, SD = 0.73). Furthermore, the regression analysis showed that artificial intelligence competencies significantly influence the preparedness of future teachers for digital classrooms ($R = 0.691$, $R^2 = 0.477$, $\beta = 0.691$, $F = 344.72$, $p < 0.05$). This implies that the acquisition of AI competencies, including AI literacy, ethical use of AI, prompt engineering, critical evaluation of AI-generated content, and the application of AI-powered instructional tools, enhances the readiness of future

teachers to effectively deliver instruction in technology-driven learning environments. The finding suggests that future teachers who possess higher levels of AI competencies are more likely to integrate intelligent technologies into classroom practice, design personalized learning experiences, provide timely feedback, and manage digital classrooms efficiently.

This finding corroborates that of Chiu (2023), who reported that AI literacy and pedagogical competencies significantly enhance teachers' confidence and preparedness for digital teaching. The finding is also consistent with Crompton and Burke (2024), who found that AI competencies were strong predictors of digital teaching readiness among pre-service teachers. Similarly, Su et al. (2024) reported that AI knowledge and practical AI application skills significantly improved student teachers' preparedness for smart learning environments. Likewise, Ayanwale and Adeniyi (2024) established a significant positive relationship between AI competencies and instructional readiness among pre-service teachers in Nigerian universities. The result equally agrees with Rahman et al. (2025), who found that AI competency training significantly improved teacher trainees' preparedness for digital classroom instruction. The consistency of these findings indicates that AI competency development has become indispensable in teacher preparation programmes as educational systems increasingly embrace digital transformation.

Curriculum Reform and the Preparedness of Future Teachers for Digital Classrooms

The findings further revealed that curriculum reform influences the preparedness of future teachers for digital classrooms to a high extent (Cluster Mean = 3.38, SD = 0.73). The regression analysis also indicated that curriculum reform significantly influences the preparedness of future teachers for digital classrooms ($R = 0.652$, $R^2 = 0.425$, $\beta = 0.652$, $F = 281.46$, $p < 0.05$). This finding implies that teacher education curricula that integrate digital literacy, artificial intelligence, instructional technologies, competency-based learning, and practical teaching experiences better prepare future teachers to function effectively in digital classrooms. Curriculum reform equips teacher trainees with contemporary pedagogical competencies required to adapt to evolving educational technologies and learner needs.

The finding agrees with UNESCO (2023), which emphasized that curriculum reforms integrating digital competencies significantly enhance teacher preparedness for technology-supported instruction. It also supports the findings of Darling-Hammond et al. (2023), who reported that redesigned teacher education curricula improved graduates' readiness for technology-enhanced learning environments. Similarly, Okoye and Eze (2024) found that curriculum reforms incorporating digital literacy and instructional technology significantly predicted digital teaching readiness among education students. The finding is equally consistent with Yusuf and Ibrahim (2024), who observed that revised teacher education curricula enhanced instructional technology competence and digital classroom management. Furthermore, Nguyen et al. (2025) concluded that competency-based curriculum reforms significantly improved digital pedagogical competence and preparedness for AI-supported teaching. The agreement between the present study and previous empirical evidence underscores the critical role of curriculum reform in producing digitally competent teachers capable of meeting the demands of twenty-first-century education.

Conclusion

Based on the findings of the study, it was concluded that artificial intelligence competencies and curriculum reform are significant determinants of the preparedness of future teachers for digital classrooms. Artificial intelligence competencies provide future teachers with the knowledge, skills, and confidence required to utilize AI-powered technologies for effective teaching, learning, assessment, and classroom management. Likewise, curriculum reform that emphasizes digital literacy, competency-based learning, practical technology integration, and emerging

educational innovations significantly enhances teacher preparedness for technology-driven instructional environments.

The study therefore concludes that preparing future teachers for digital classrooms requires deliberate investment in AI competency development and continuous curriculum reform. Teacher education institutions should prioritize the integration of AI education and digital pedagogical competencies into their programmes to produce graduates capable of meeting the evolving demands of twenty-first-century classrooms.

Recommendations

Based on the findings and conclusion of the study, the following recommendations were made:

1. Teacher education institutions should integrate comprehensive artificial intelligence competency training into teacher preparation programmes to equip future teachers with the knowledge and practical skills required for digital classroom instruction.
2. Curriculum developers and regulatory agencies, such as the National Universities Commission (NUC) and the National Commission for Colleges of Education (NCCE), should periodically review teacher education curricula to incorporate emerging technologies, artificial intelligence, digital pedagogy, and competency-based learning approaches.
3. University managements should provide adequate digital infrastructure, AI-powered instructional technologies, reliable internet connectivity, and smart learning environments to facilitate effective implementation of AI-enhanced teacher education.
4. Teacher educators should participate in regular professional development programmes on artificial intelligence, digital pedagogy, and innovative instructional strategies to improve their capacity to train future teachers.
5. Government and educational stakeholders should allocate adequate funding to support curriculum innovation, educational technology integration, and digital capacity-building initiatives within teacher education institutions.
6. Pre-service teachers should be encouraged to continuously develop their AI competencies through self-directed learning, online certification programmes, practical projects, and participation in digital innovation initiatives to enhance their professional readiness for modern classrooms.

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