

Pedagogical and Institutional Challenges affecting integration of Artificial Intelligence Tools among Pre-service Social Science Teachers in Colleges of Education, Kwara State

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Abstract

Artificial Intelligence (AI) is increasingly transforming educational delivery globally due to its capacity to enhance personalized learning, improve instructional efficiency, and support effective assessment practices. Despite these potentials, the integration of AI into teacher education remains relatively limited. This study investigated the awareness and extent of use of AI tools and the pedagogical and institutional challenges affecting their integration among pre-service social science teachers in Colleges of Education in Kwara State, Nigeria. The study adopted a descriptive survey research design. A multi-stage sampling technique was employed to selected 565 respondents. Data were collected using a structured questionnaire titled 'Pedagogical and Institutional Challenges Affecting AI Integration Questionnaire (PICAIIQ)' developed by the researcher. The instrument was subjected to face and content validity, while its reliability was established using Cronbach's Alpha, with its coefficients ranging from 0.78 to 0.86, indicating acceptable internal consistency. The findings revealed that pre-service social science teachers demonstrated a high level of awareness of AI tools in education (mean = 3.44 > 2.50), but a low extent of use (mean = 2.17 < 2.50). In addition, a significant difference was found between male and female pre-service social science teachers regarding the extent of AI tools usage ($p < 0.05$). The study concludes that although awareness of AI tools is high, limited practical utilization may hinder effective integration of AI tools. It is therefore recommended that Colleges of Education should provide regular training and institutional support to enhance pre-service teachers' competence in the use of AI tools for teaching and learning.

Keywords: Artificial intelligence, Pre-service teachers, Pedagogical, Institutional challenges, Education

1. Introduction

The rapid advancement of Artificial Intelligence (AI) technologies has significantly transformed educational practices worldwide, offering innovative opportunities for enhancing teaching, learning, assessment, and teacher preparation. AI tools, such as intelligent tutoring systems, adaptive learning platforms, automated assessment systems, and generative AI applications have demonstrated considerable potential in supporting personalised learning, improving instructional efficiency, and fostering higher-order thinking skills, particularly in social science education (Ahmad et al., 2021; Cukurova et al., 2025). As social science education increasingly demands inquiry-based, data-driven, and technology-enhanced pedagogies, the integration of AI tools has become a critical component of effective teacher education programmes.

Globally, teacher education institutions are under pressure to prepare pre-service teachers who are not only content-competent but also technologically and pedagogically equipped to function in digitally mediated classrooms. However, evidence suggests that while AI technologies are rapidly entering higher education systems, their pedagogical integration remains uneven and fraught with challenges, especially in developing contexts (OECD, 2026; Ogunleye et al., 2024). Therefore, for pre-service

social science teachers to effectively integrate AI tools require more than mere awareness; it demands adequate pedagogical knowledge, ethical understanding, institutional support, and access to functional infrastructure. Social science pre-service teachers are colleges of education students enrolled in teacher's education programs training to become educators in subjects like History, Geography, Civics, and Economics. According to IGI Global, often called teacher trainees.

In Nigeria, the adoption of AI in teacher education is still at an emergent stage. In a study conducted by Bolaji and Ahmed (2025) indicated that pre-service teachers exhibit moderate awareness of AI tools, actual utilisation for instructional purposes remains low (Olaewaju et al., 2025). Empirical evidence from Kwara State reveals that inadequate training, poor technological infrastructure, limited pedagogical support, and institutional resistance significantly constrain the effective use of AI tools among pre-service teachers (Olaewaju et al., 2025). These challenges are further exacerbated by unstable power supply, limited internet connectivity, insufficient AI-related coursework, and weak policy frameworks guiding AI use in education (Tsakeni & Nwafor, 2024; Spursmedia, 2024).

Beyond infrastructural deficits, pedagogical challenges pose substantial barriers to AI integration. Many pre-service social science teachers lack the necessary AI literacy and Technological Pedagogical Content Knowledge (TPACK) required to meaningfully embed AI tools into teaching and learning (Tsakeni & Nwafor, 2024). Concerns have also been raised regarding overreliance on AI, academic dishonesty, reduced teacher agency, and ethical issues such as data privacy, algorithmic bias, and fairness issues that are particularly pronounced in contexts with limited regulatory oversight (OECD, 2026; Temitope, 2024). Without appropriate pedagogical guidance, AI tools risk becoming shortcuts to learning rather than catalysts for deep conceptual understanding, especially in social science education where critical thinking and inquiry are essential.

Also, institutional challenges further complicate AI integration efforts. Many teacher education institutions in Nigeria lack coherent institutional policies, strategic leadership, and sustained professional development programmes to support AI adoption. The absence of clear guidelines and supportive institutional cultures often results in fragmented and superficial use of AI technologies, limiting their pedagogical impact (Adewale, 2024; Ogunleye et al., 2024). In Kwara State, these institutional constraints intersect with pedagogical limitations, creating a complex ecosystem that undermines the effective integration of AI tools among pre-service social science teachers. Despite growing scholarly interest in AI adoption in Nigerian education, limited studies have specifically examined the combined pedagogical and institutional challenges affecting AI integration among pre-service social science teachers at the sub-national level. Addressing this gap is crucial, as social science teachers play a pivotal role in preparing learners for participation in technologically driven societies.

1.1 Statement of the problem

Artificial Intelligence (AI) technologies have become increasingly prominent in contemporary social science education due to their potential to enhance personalised learning, instructional efficiency, and assessment practices. Teacher education programmes are therefore expected to prepare pre-service teachers with the pedagogical competencies and technological skills required to integrate AI tools effectively into classroom instruction. However, the integration of AI into teacher education remains limited. In Kwara State, pre-service social science teachers often demonstrate low levels of practical engagement with AI tools due to insufficient AI literacy, limited pedagogical competence, ethical concerns, and difficulties aligning AI applications with social science curricula. These pedagogical challenges hinder the meaningful use of AI tools and restrict their potential to improve social science teaching and learning outcomes.

In addition to pedagogical constraints, institutional challenges such as inadequate technological infrastructure, unstable internet connectivity, insufficient funding, lack of institutional policies, and limited professional development opportunities further impede the integration of AI tools in teacher education institutions. These institutional barriers create unsupportive learning environments that discourage innovation and restrict sustained AI adoption. Despite

increasing scholarly attention to educational technology in Nigeria, there remains a scarcity of empirical studies that examine the combined influence of pedagogical and institutional challenges on AI tool integration among pre-service social science teachers, particularly at the sub-national level such as Kwara State. This gap in research limits evidence-based policy formulation and curriculum reform, thereby necessitating an empirical investigation into the pedagogical and institutional challenges affecting the integration of AI tools among college of education pre-service social science teachers in Kwara State, Nigeria.

1.2 Research Objectives

The main objective of this study is to examine the pedagogical and institutional challenges affecting the integration of Artificial Intelligence (AI) tools among college of education pre-service social science teachers in Kwara State, Nigeria.

The specific objectives are to:

1. Does colleges of education curriculum align with the integration of AI tools among pre-service social science teachers in Kwara State?
2. Determine the level of awareness of Artificial Intelligence tools among college of education pre-service social science teachers in Kwara State.
3. Determine the use of Artificial Intelligence tools among college of education pre-service social science teachers in Kwara State.
4. Identify pedagogical challenges influencing the integration of AI tools among college of education pre-service social science teachers in Kwara State.
5. Examine institutional challenges affecting the integration of AI tools among college of education pre-service social science teacher in Kwara State.

1.3 Research Questions

The study will be guided by the following research questions:

1. Does colleges of education curriculum align with the integration of AI tools among college of education pre-service social science teachers in Kwara State?
2. What is the level of awareness of Artificial Intelligence tools among college of education pre-service social science teachers in Kwara State?
3. What is the extent of use of Artificial Intelligence tools among college of education pre-service social science teachers in Kwara State?
4. What pedagogical challenges affect the integration of AI tools among college of education pre-service social science teachers in Kwara State?
5. What institutional challenges influence the integration of AI tools among college of education pre-service social science teachers in Kwara State?

1.4 Research Hypotheses

H₀₁: There is no significant difference in the extent of use of Artificial Intelligence tools among college of education pre-service social science teachers in Kwara State based on gender.

H₀₂: There is no significant difference in the pedagogical challenges affecting the integration of AI tools among

college of education pre-service science teachers in Kwara State based on gender.

H₀₃: There is no significant difference in the institutional challenges affecting the integration of AI tools among college of education pre-service science teachers in Kwara State based on gender.

2. Methodology

This study adopted a descriptive survey research design with a mixed quantitative and qualitative approach to examine the pedagogical and institutional challenges affecting the integration of Artificial Intelligence (AI) tools among pre-service social science teachers in Kwara State, Nigeria. The population of the study comprised all pre-service social science teachers enrolled in Colleges of Education in Kwara State. A multi-stage sampling technique was employed for the study. In the first stage, teacher education institutions offering social science education programmes in Kwara State were purposively selected. In the second stage, stratified random sampling was used to categorise pre-service social science teachers based on their areas of specialisation (e.g., Economics, Geography, Business Studies, and Social Studies). In the final stage, simple random sampling was used to select respondents from each stratum. A sample size of 565 using Krejcie and Morgan's table was selected to ensure adequate representation.

Data was collected using a structured questionnaire titled Pedagogical and Institutional Challenges Affecting AI Integration Questionnaire (PICA IQ), developed by the researcher. The instrument consisted of six sections: Section A is on the Demographic information of respondents; section B focuses on the Awareness of AI tools while section C is on extent of use of AI tools. Section D is on Pedagogical challenges affecting AI integration and Section E is on Institutional challenges affecting AI integration. Items in Sections B–E were structured on a four-point Likert scale ranging from Strongly Agree (4) to Strongly Disagree (1) while Section F contains semi-structures interview questions. The instrument was subjected to face and content validity by experts in Educational Technology, Social Science Education, and Measurement and Evaluation. Their comments and suggestions were used to refine the questionnaire items to ensure clarity, relevance, and alignment with the study objectives. The reliability of the instrument was determined using the Cronbach's Alpha method. A pilot test was conducted using pre-service science teachers from a neighboring state not included in the main study. The reliability coefficients obtained for the sub-sections ranged between 0.78 and 0.86, indicating that the instrument was reliable for the study. Demographic data collected were analysed using frequency count and percentage and table. Research question one was answer qualitatively using thematic analysis of Braun & Clark (2019), research questions 2, 3, 4, and 5 were answered using descriptive statistics percentage, mean, and standard deviation while the three hypotheses were tested using t-test at 0.05 alpha level.

3. Results

Table 1: Demographic Profile of the Respondents

Teachers Gender	Frequency	Percentage
Male	218	38.60
Female	347	61.40
Total	565	100%

Table 1 reveals the demographic profile of the respondents. As shown on the table 1, 218 (38.60%) are male respondents while 347 (61.40%) female respondents participated in this study.

Research Question 1: Do colleges of education curriculum align with the integration of AI tools among pre-service social science teachers in Kwara State?

Thematic Analysis of Braun and Clark's steps of (Codes Generated, Themes Identified and implication for the study) was used to analyse the qualitative data collected. The semi-structured interview questions were structured into codes which inferred that: no curriculum content on evaluation, self-developed verification, peer consultation, textbook comparison, low confidence, no training on AI, absence of writing policy, no formal requirement. This implies that that curriculum does not provide pedagogical strategies and institutional policy for the use of AI tools among pre-service social science teachers in colleges of education in Kwara State. Therefore, the data collected suggested that there is curriculum misalignment which is a barrier because AI is absent from course content, policy and assessment, the pre-service social science teachers experience low confidence and resort to unregulated personal use.

Research Question 2: What is the level of awareness of Artificial Intelligence tools among college of education pre-service social science teachers in Kwara State?

Table 2: Level of awareness of Artificial Intelligence tools among college of education pre-service social science teachers in Kwara State

Item	Mean	S.D	Remark
I am aware of Artificial Intelligence (AI) tools used in education.	3.29	0.79	Aware
Aware of AI images, simulation, generator e.g. DALL-E, PhET.	3.48	0.76	Aware
I am familiar with examples of AI tools such as ChatGPT, Grammarly, or educational chatbots.	3.46	0.67	Aware
I am aware of Kahoot to create impactful interactive lesson.	3.55	0.74	Aware
I am aware of Mizai to create instant lesson plan	3.40	0.74	Aware
Overall Mean	3.44	0.74	

Table 2 reveals the level of awareness of AI tools used in education which indicates that the college of education pre-service social science teachers in Kwara State are aware of the AI tool used in education with overall mean of 3.44. Specifically, all the items are accepted as the level of awareness of AI by college of education pre-service social science teachers with mean scores of 2.5 and above. The respondents affirmed that they familiar with examples of AI tools such as ChatGPT, Grammarly, or educational chatbots; aware of AI images, simulation, generator e.g.

DALL-E, PhET, aware of Artificial Intelligence (AI) tools used in education and so on. This implies that the college of education pre-service social science teachers have high level of awareness of AI tools in education.

Research Question 3: What is the extent of use of Artificial Intelligence tools among college of education pre-service social science teachers in Kwara State?

Table 3: Extent of use of Artificial Intelligence tools among college of education pre-service social science teachers in Kwara State

Item	Mean	S.D	Remark
I use AI tools to prepare teaching materials	2.05	1.15	Low
I use AI tools such as Chatbots and virtual assistants.	2.07	0.94	Low
I use AI tools for assessment or grading tasks	2.36	0.86	Low
I use AI tools (e.g. Cyripod, Tich, and Magic-schoolAI to generate teaching ideas or lesson plans.	2.30	0.71	Low
I encourage students to use AI tools for academic purposes.	2.06	0.94	Low
Overall Mean	2.17	0.92	

Table 3 reveals the extent of use of Artificial Intelligence tools among college of education pre-service social science teachers in Kwara State which shows that college of education pre-service social science teachers in Kwara State are low in the use of AI tools in education with overall mean of 2.17. Looking at its item by item, all the items were rejected as the Extent of use of AI tools by pre-service social science teachers with mean scores of 2.5 and below. The respondents rejected that they use AI tools to prepare teaching materials, use AI tools (e.g. Cyripod, Tich, Magic-schoolAI to generate teaching ideas or lesson plans, encourage students to use AI tools for academic purposes and so on. This indicates that the college of education pre-service social science teachers are low in the level of use of AI tools in education in Kwara State.

Research Question 4: What pedagogical challenges affect the integration of AI tools among college of education pre-service social science teachers in Kwara State?

Table 4: Pedagogical challenges affect the integration of AI tools among college of education pre-service social science teachers in Kwara State

Item	Mean	S.D	Remark
I lack adequate training on how to integrate AI tools into teaching	3.39	0.70	Accept
Integrating AI tools into lessons is difficult due to limited technical skills	3.41	1.01	Accept
AI tools are difficult to align with the existing curriculum	3.09	0.98	Accept
I am unsure how to effectively use AI tools to improve students' learning outcomes.	3.92	0.91	Accept
Fear of overdependence on AI discourages its use in teaching.	3.09	1.20	Accept
Overall Mean	3.38	0.96	

Table 4 reveals the pedagogical challenges affecting the integration of artificial intelligence tools among college

of education pre-service social science teachers in Kwara State. The overall mean of 3.38 is above the benchmark of 2.50, which falls in the acceptance region. This indicates that pedagogical challenges affect the integration of AI tools among college of education pre-service social science teachers in Kwara State. Specifically, all the items were accepted as the pedagogical challenges affect the integration of AI tools by college of education pre-service social science teachers with mean scores above 2.5 which implies that the respondents affirmed that they lack adequate training on how to integrate AI tools into teaching, Integrating AI tools into lessons is difficult due to limited technical skills, AI tools are difficult to align with the existing curriculum and so on. This indicates that the college of education pre-service social science teachers were affected by the pedagogical challenges in Integrating AI tools in education in Kwara State.

Research Question 5: What institutional challenges influence the integration of AI tools among college of education pre-service social science teachers in Kwara State?

Table 5: Institutional challenges influence the integration of AI tools among college of education pre-service social science teachers in Kwara State

Item	Mean	S.D	Remark
My institution lacks adequate technological infrastructure to support AI integration.	3.95	1.00	Reject
There is insufficient institutional support for the use of AI tools in teaching.	3.16	1.11	Reject
Lack of funding limits the adoption of AI technologies in my institution	3.22	1.10	Reject
My institution does not provide adequate training programs on AI tools.	3.13	0.98	Reject
There are no clear policies guiding the use of AI tools in my institution.	3.87	0.97	Reject
Overall Mean	3.47	1.03	

Table 5 shows the influence of institutional challenges in the integration of AI tools among college of education pre-service social science teachers in Kwara State. The overall mean of 3.47 is above the benchmark of 2.50, which falls in the acceptance region. This indicates that institutional challenges influence the integration of AI tools among college of education pre-service social science teachers in Kwara State. Specifically, all the items were accepted as the institutional challenges affect the integration of AI tools among pre-service social science teachers with mean scores above 2.5 which implies that the respondents accept that there is insufficient institutional support for the use of AI tools in teaching, lack of funding limits the adoption of AI technologies in my institution, there are no clear policies guiding the use of AI tools in my institution and so on. This indicates that the college of education pre-service social science teachers were influenced by the institutional challenges in Integrating AI tools in education in Kwara State.

3.1 Hypothesis Testing

Independent sample t-test was used to analyse the three research hypotheses, and it was test at 0.05 level of significance.

H₀₁: There is no significant difference in the extent of use of Artificial Intelligence tools among college of education pre-service social science teachers in Kwara State based on gender.

Table 6: Independent Sample t-Test analysis of extent of use of Artificial Intelligence tools among college of education pre-service social science teachers in Kwara State base on gender

		Gender	Mean	F	Df	T. cal.	Sig.
Extent of Use of AI	Equal variance assumed	Male	16.32	8.5	56	2.5	.01
	Equal variance not assumed	Female	15.38	2	3	4	1

P<0.05 significant.

The Independent sample t-test is the test of difference between two variables. In this case, comparison of the mean of two separate unrelated groups of male and female responses to the use of artificial intelligence was carried out to see the significant difference in their extent of use of AI.

Table 6 revealed that the significant of 0.011 is less than P. value of 0.05. Therefore, reject the null hypothesis and accept the alternative hypothesis. This implies that there is a significant difference between male and female as regard the extent of use of AI tools among college of education pre-service social science teachers in Kwara State. That is the male tend to perform better with the mean of 16.32 compared to their female counterpart with the mean of 15.38 in table 6.

H₀₂: There is no significant difference in the pedagogical challenges affecting the integration of AI tools among college of education pre-service social science teachers in Kwara State base on gender.

Table 7: Independent Sample t-Test analysis of pedagogical challenges affecting the integration of AI tools base on gender

		Gender	Mean	F	Df	t. cal.	Sig.
Pedagogical Challenges	Equal variance assumed	Male	17.40	26.28	56	1.207	.2
	Equal variance not assumed	Female	17.04				

P>0.05 Not Significant

Table 7 revealed that the (t.cal (536) = 1.207; P>0.05) sig. of 0.228 is greater than P. value of 0.05. Therefore, accept the null hypothesis. This implies that there is no significant difference between male and female as regard pedagogical challenges in the integration of AI tools among college of education pre-service social science teachers in Kwara State. That is female and male does not differ as regard pedagogical challenges with almost equal mean of 17 as displayed by table 7.

H₀₃: There is no significant difference in the institutional challenges affecting the integration of AI tools among college of education pre-service social science teachers in Kwara State based on gender.

Table 8: Independent Sample t-Test Analysis of institutional challenges affecting the integration of AI tools base on gender

		Gender	Mean	F	Df	t. cal.	Sig.
Pedagogical Challenges	Equal variance assumed	Male	11.68	27.06	56	5.41	.00
	Equal variance not assumed	Female	9.49				

P<0.05 Significant

Table 8 revealed that the t.cal (536) = 5.41; P<0.05. Therefore, reject the null hypothesis and accept the alternative hypothesis. This implies that there is a significant difference between male and female as regard the influence of institutional challenges in the integration of AI tools among college of education pre-service social science teachers in Kwara State. That is the male tend to perform better with the mean of 11.68 compared to their female counterpart with the mean of 9.49 in table 8

4. Discussion of Findings

This study examined the pedagogical and institutional challenges affecting the integration of Artificial Intelligence (AI) tools among college of education pre-service social science teachers in Kwara State, Nigeria. A total of 565 college pre-service teachers (final year students) were sampled and the data collected were analyse using mean, standard deviation and independent t-test. The data indicated that curriculum misalignment constitutes a major barrier because AI is absent from course content, policy, and assessment. Consequently, pre-service social science teachers reported low confidence and resorted to unregulated personal use of AI tools. This finding aligns with recent studies showing that teacher education curricula in many developing contexts have not kept pace with emerging technologies. Yusuf et al. (2023) found that colleges of education in Nigeria rarely include AI literacy in their course outlines, leaving pre-service teachers to experiment without pedagogical guidance. Similarly, Mishra (2024) argued that the absence of explicit AI competencies in teacher standards leads to anxiety and

informal adoption patterns among trainees. The lack of policy also align with Okebukola et al. (2023) submission that institutional silence on AI forces students to develop “survival strategies” that may conflict with academic integrity. Thus, curriculum misalignment does not only limit skill acquisition but also shapes risky, unsupervised usage.

The study revealed that the pre-service social science teachers had high in their level of awareness of AI tools but low level of usage of AI tools in college of education in Kwara State which corroborate the submission of Bolaji and Ahmed, (2025); Olarewaju et al., (2025) that pre-service teacher’s exhibit moderate awareness of AI tools, and that actual utilisation of AI tools for instructional purposes remains low respectively. This may be due to concerns raised regarding overreliance on AI, academic dishonesty, reduced teacher agency, and ethical issues such as data privacy, algorithmic bias, and fairness issues that are particularly pronounced in contexts with limited regulatory oversight (OECD, 2026; Temitope, 2024). Their low level of utilisation of AI tools may be affected by unstable power supply and limited internet connectivity issues raised by (Spursmedia, 2024; Tsakeni & Nwafor, 2024).

The findings of the study further revealed that the college of education pre-service social science teachers were affected by the pedagogical and institutional challenges in Integrating AI tools in education in Kwara State which is in tandem with the study of Olarewaju et al., (2025) that inadequate training, poor technological infrastructure, limited pedagogical support, and institutional resistance significantly constrain the effective use of AI tools among pre-service teachers. This further supported by the submission of Adewale (2024) and Ogunleye et al., (2024) that the absence of clear guidelines and supportive institutional cultures often results in fragmented and superficial use of AI technologies, limiting their pedagogical impact. This study findings also affirmed the statement of Tsakeni and Nwafor, (2024) that many pre-service teachers lack the necessary AI literacy and Technological Pedagogical Content Knowledge (TPACK) required to meaningfully embed AI tools into social science teaching and learning.

Another exciting finding of this study is that there is a significant difference between male and female as regard the extent of use of AI tools among college of education pre-service social science teachers in Kwara State. That is the male tend to perform better than female pre-service teachers. This corroborate the work of Musa et al. (2026) and Nyaaba, et al. (2024) that there is a significant gender disparity in the use of AI tools with male pre-service teachers a high frequency of use compared to their female counterparts. It was also found that there is no significant difference between male and female pre-service teachers regarding pedagogical challenges in AI tool integration. This suggests that pedagogical challenges such as prompt writing, content evaluation, and curriculum linkage are experienced similarly across genders. This agree with the study of Lawrence and Adebayo (2024), who reported that gender did not predict technology integration barriers among Nigerian pre-service teachers when access and training were held constant. Likewise, Alghamdi and Al-

Hattami (2023) submission that pedagogical challenges with AI are more strongly associated with prior exposure and institutional support than with gender lend credence to these findings that pedagogical challenges in AI tools integration do not differ between male and female pre-service social science teachers. Therefore, interventions targeting pedagogical readiness should be designed for all pre-service teachers rather than gender-specific cohorts.

The Study results revealed further that a significant difference in institutional challenges, with male pre-service teachers reporting higher scores than females. This indicates that males perceived or experienced greater institutional barriers to AI integration. This is in contrast to the submission of Eze et al. (2024); Okonkwo & Bello (2023), who found that male students in Nigerian Colleges of Education were more likely to use computer labs after hours and thus more likely to encounter infrastructure failures like power outages, internet restrictions and that social expectations may lead male students to attempt more independent experimentation with AI, exposing them to institutional bottlenecks. This finding contrasts with earlier assumptions that female students face greater tech barriers and highlights the need to disaggregate “institutional challenges” by type of resource and time of access.

5. Limitation of the Study

This study is limited in scope as generalizability is with the local of this study. Also, it is not a cause-and-effect study, not cross-sectional research (no causality). The quantitative data collected was based on four points forced-choice scale.

6. Conclusion

This study concluded that the college of education pre-service social science teachers are high in their level of awareness of AI tools in education in Kwara State but low in the extent of use of the AI tools. Pedagogical and institutional challenges affect the integration of Artificial Intelligence (AI) tools among college of education pre-service social science teachers in Kwara State, Nigeria. Also, there is a significant difference between male and female in the extent of use and institutional challenges of integration AI tools among college of education pre-service social science teachers in Kwara State but the reverse is the case as regard pedagogical challenges in the integration of AI tool.

7. Recommendation

This study recommended that AI related course should be introduced in our colleges of education in Nigeria to positively affect the level of AI tools awareness among pre-service teachers. A strong policy framework should be drafted to guide the use of AI in education which influences their knowledge and in turn reduces pedagogical challenges. Colleges of education curriculum should be reviewed by experts to incorporate AI based on global best practice in other mitigate the effect of pedagogical challenges of AI integration. Also, Colleges of Education should provide regular training and institutional support to enhance pre-service teachers’ competence in the use of AI tools for teaching and learning.

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Appendix I

Questionnaire Titled: Pedagogical and Institutional Challenges Affecting AI Integration Questionnaire (PICAIQ).

Section A: Demographic Information of Respondents

Please tick (✓) the option that best describes you.

1. **Gender:**

☐ Male ☐ Female

2. **Colleges of Education:**

- ☐ Kwara State College of Education, Ilorin
☐ Kwara State College of Education, Oro
☐ Kwara State College of Education, Lafiagi
☐ Muideen College of Education, Ilorin
☐ Kwara State College of Arabic Studies, Ilorin

Kindly tick as appropriate (✓) Items in the Sections B–E which is structured on a four-point Likert scale ranging from Strongly Agree (4) to Strongly Disagree (1).

Section B: Awareness of Artificial Intelligence Tools	SA	A	D	SD
I am aware of Artificial Intelligence (AI) tools used in education.				
Aware of AI images, simulation, generator e.g. DALL-E, PhET, etc.				
I am familiar with examples of AI tools such as ChatGPT, Grammarly, or educational chatbots, etc.				
I am aware of Kahoot to create impactful interactive lesson.				
I am aware of Mizai to create instant lesson plan				
Section C: Extent of Use of Artificial Intelligence Tools				
I use AI tools to prepare teaching materials				
I use AI tools such as Chatbots and virtual assistants.				
I use AI tools for assessment or grading tasks				

I use AI tools (e.g. Cyripod, Tich, and Magic-schoolAI to generate teaching ideas or lesson plans.				
I encourage students to use AI tools for academic purposes.				
Section D: Pedagogical Challenges Affecting AI Integration				
I lack adequate training on how to integrate AI tools into teaching				
Integrating AI tools into lessons is difficult due to limited technical skills				
AI tools are difficult to align with the existing curriculum				
I am unsure how to effectively use AI tools to improve students' learning outcomes.				
Fear of overdependence on AI discourages its use in teaching.				
Section E: Institutional Challenges Affecting AI Integration				
My institution lacks adequate technological infrastructure to support AI integration.				
There is insufficient institutional support for the use of AI tools in teaching.				
Lack of funding limits the adoption of AI technologies in my institution				
My institution does not provide adequate training programs on AI tools.				
There are no clear policies guiding the use of AI tools in my institution.				

Section F: The following semi-structured interview questions were develop and presented to the respondents to gather some qualitative data about curriculum alignment for the integration of AI tools among pre-service social science teachers in colleges of education in Kwara State.

1. Does your curriculum teach you how to critically evaluate AI-generated content before using it in class? Yes or No. if not, how do you decide what to keep or reject?

2. How confident are you that your training has equipped you with teaching strategies for an AI-enable classroom? Yes or No. why?

3. Does your institution have any written policy or curriculum guidelines on AI use for pre-service teachers? Yes or No. have your lecturer mentioned any rules?

4. Have you been asked to use an AI too as part of a course assignment, micro-teaching, or teaching practice? Yes or No. why the use?

5. Are there any specific courses, modules or topics in your curriculum that address Artificial Intelligence? Yes or No. was it compulsory, optional or discourage?
