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INSTITUTIONAL LEADERSHIP AND HUMAN-AI COLLABORATIVE SMART CLASSROOMS: FROM POLICY TO PRACTICE IN PUBLIC UNIVERSITIES IN EKITI STATE, NIGERIA

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ABSTRACT

As generative artificial intelligence (AI) transforms higher education, effective institutional leadership is critical for ensuring the implementation, monitoring and sustainability of AI policies. However, empirical evidence remains limited on how university administrators translate AI policies into practice. This study therefore examined the relationship between institutional leadership and human-AI collaborative smart classrooms in public universities in Ekiti State, Nigeria. The study adopted a cross-sectional correlational research design. The population comprised 581 academic staff from the Faculties of Education in the three public universities in Ekiti State. A sample of 250 academic staff, which represents 43% of the population was drawn using multi-staged sampling procedure. Two self-developed structured scales were used as instruments for data collection: Institutional Leadership Scale (ILS) *and Human-AI Collaborative Smart Classrooms Scale (HAICSCS). Both instruments were designed on a four-point scale, and were duly validated by five experts. The internal consistency of the instruments was established using Cronbach's Alpha method. The reliability yielded coefficient values of 0.84 for the ILS and 0.79 for the HAICSCS, with an overall reliability index of 0.82, indicating that the instruments were sufficiently reliable for data collection. Pearson's Product Moment Correlation Coefficient was used to answer the research questions and test the null hypotheses at 0.05 level of significance using SPSS Statistics version 23. The findings revealed among others, that institutional leadership has a positive and significant relationship with human-AI collaborative smart classrooms. The study concludes that institutional leadership is critical in bridging the gap between policy formulation and the implementation of AI-driven classroom practices. It recommends, among others, that university administrators should always endeavour to provide supportive learning environments, and enforce policies on AI integration that promote human-centred approaches in order to meet the demands of the Fifth Industrial Revolution.*

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Keywords: institutional leadership, human-AI, collaborative learning, smart classroom, AI-policy and Fifth Industrial Revolution.

Introduction

The emergence of generative artificial intelligence (AI) in this current wave of technological transformation has necessitated the adoption of innovative, human-centred approaches in university classroom practices. Among these emerging innovations is human-AI collaboration, which is transforming traditional learning approaches into interactive digital learning environments. Atchley et al. (2024) defined human-AI collaborative smart classrooms as modern learning environments where human intelligence (teachers and students) and artificial intelligence systems work together to enhance teaching, learning, assessment and classroom management. Studies have shown that human-AI collaborative smart classrooms are gaining attention in the education sector for transforming pedagogical practices (Ocen et al., 2025; Zhou et al., 2025). Thus, AI is revolutionising the education sector by significantly reducing lecturers' workload and enabling them to focus more on research and administrative responsibilities. In this AI-driven era, teachers are no longer solely responsible for managing all aspects of instructional delivery. Instead, they are supported by AI-powered learning tools that assist with generating and curating appropriate instructional materials, designing diverse teaching strategies, automating assessment and grading, delivering personalised feedback, recommending tailored learning resources, monitoring and analysing students' progress, identifying learning gaps and supporting differentiated instruction (Agbaraekwe & Chibueze, 2024; Bali et al., 2024; Dai etal., 2025; Eleje et al., 2025). However, the successful transition from policy to practice in human-AI collaborative smart classrooms depends largely on the role of institutional leadership in driving vision, coordination and implementation.

Institutional leadership refers to the ways in which administrators guide decision-making, set priorities and manage resources within an educational institution. It also involves the development of clear policies and guidelines, as well as the provision of supportive environments that facilitate the achievement of educational goals and objectives (Adieme & Ukala, 2024). Sposato (2025) noted that AI integration in higher institutions has underscored the importance of institutional leadership in managing change and innovation. For universities to remain relevant in this AI-driven era, they must adopt smart education, ensure that infrastructure and pedagogical support systems are in place to assist both lecturers and students in adapting to smart ecosystems. George and Wooden (2023); Furey and Martin (2019) found that institutional leadership plays a pivotal role in providing supportive environments that enhance human-AI collaborative smart classrooms. Similarly, Hannan and Liu (2023) found that smart universities redesign curriculum development and instruction to align with effective integration of human-AI

collaboration. In a related study, Eleje et al. (2025) revealed that generative AI improves collaborative learning among lecturers and students in Nigerian higher education. Hence, this can only be achieved when school administrators establish strong guidelines on human-AI, and encourage lectures to integrate it effectively and ethically.

Theoretical Framework

This study is anchored on Socio-Technical Systems (STC) Theory which was propounded by Eric Trist and Ken Bamforth in 1951**.** It provides a theoretical lens for understanding how institutional leadership, teachers, students and AI tools interact within smart classrooms. According to Trist and Bamforth (1951), every organisation consists of two interdependent subsystems: the social subsystem**,** which includes people, leadership, communication and organisational culture; and the technical subsystem, which includes machines, technologies, procedures and tools used to accomplish tasks. The theory posits that optimal performance can only be attained when both systems are designed to work together harmoniously. This theory is relevant to this study because teachers and students interact continuously with AI-powered tools and systems to enhance teaching and learning processes. Thus, human-AI collaboration underscores the idea of the Fifth Industrial Revolution that technology should not replace humans, but rather, support and enhance their capabilities.



Figure 1: Sociotechnical Theoretical Framework
Source: Adopted fromPyschsafety.com. https://psychsafety.com/sociotechnical-theory/

Literature Review

Supportive Learning Environment and Human-AI Collaborative Smart Classrooms

A supportive learning environment refers to a classroom climate that enables students to learn seamlessly. In higher education, it includes factors such as access to learning resources, positive teacher-student relationships, inclusive instructional practices and the availability of tools that make learning easier and more interactive

(Adieme, 2025). Hence, the effectiveness of Human-AI collaboration depends largely on how well the learning environment is structured and supported by universities. Extant studies have shown that a supportive learning environment also includes digital infrastructure (Dimitriadou & Lanitis, 2023) and user-friendly systems that help students learn at their own pace while receiving timely guidance (Zawacki-Richter et al., 2019). It has also been documented that the increasing use of human-AI collaborative classrooms has improved the availability of instructional materials, reducing the need for teachers to rely on improvisation when resources are not readily available (Dhanasekaran, 2025; Han et al., 2025; Nnaji et al., 2026). However, the success of human-AI integration in education depends not only on the availability of digital tools but also on the effectiveness of their management and implementation within institutional settings (Asghar et al., 2025; George & Wooden, 2023). Similarly, Ocen et al. (2025) revealed that AI systems assist educators in providing and adapting appropriate learning materials; thereby, making teaching more consistent, resource-rich, and responsive to students' diverse needs. Thus, human-AI collaborative smart classrooms are more dynamic as AI systems actively contribute to shaping and reshaping instructional experiences.

Leveraging AI learning systems in smart classrooms can mitigate the challenge of limited instructional resources that negatively affect students' learning outcomes. AI tools provide real-time feedback, adaptive learning pathways, and personalised recommendations that enable students to grasp difficult concepts at their own pace (Eleje et al., 2025; Ghamrawi et al., 2026; Zawacki-Richter et al., 2024). In addition, human-AI collaboration reduces learning pressure and fosters a more inclusive classroom environment where learners with diverse abilities can progress at different rates (Sposato, 2025). Research by Tang et al. (2020) found that AI-powered adaptive learning platforms can tailor educational content to individual student needs; thereby, addressing challenges in differentiated instruction. Similarly, Ocen et al. (2025) observed that when institutional leaders create supportive environments for human-AI collaborative smart classrooms, students' learning needs and styles are met, as instruction is no longer constrained by a single teaching method. Studies have shown that the effectiveness of human-AI collaborative smart classrooms is strongly influenced by the quality of the learning environment, access to digital infrastructure and AI tools (Chen et al., 2020; Jiao et al., 2022). In another study, Dai et al. (2025); Pietsch & Mah, 2023) discovered that technology alone is not enough; rather, a supportive environment is necessary to translate AI capabilities into meaningful educational outcomes. Hence, if students have access to digital tools and supportive instructional practices, they would participate more actively and achieve better learning outcomes.

Staff Capacity Building and Human-AI Collaborative Smart Classrooms

Staff capacity building refers to the continuous development of lecturers' knowledge, skills and professional competencies required to remain relevant in the teaching profession. In AI-driven smart learning environments, it involves equipping lecturers with the digital skills and innovative teaching approaches needed to effectively use emerging instructional technologies (Nzokurum & Adieme, 2023). According to Zawacki-Richter et al. (2019), capacity building is particularly important in the education system because it determines how well lecturers can integrate new digital tools into classroom practices, and adapt to changing instructional demands. Thus, staff capacity building becomes a critical factor for effective teaching-learning process in human-AI collaborative smart classrooms. AI systems are designed to support lecturers by automating routine tasks such as grading, providing feedback and tracking student progress (Agbarakwe & Chibueze, 2024; Dai et al., 2025). However, these benefits can only be fully realised when lecturers are guided on how to use these tools effectively and ethically (El-Samaty & Albadi, 2026; Holmes et al., 2022). Previous studies have established that the success of smart learning environments depends not merely on access to AI tools but also on sustained professional development that equips lecturers with the pedagogical competencies required to integrate AI meaningfully into classroom practices (Atchley et al., 2024; Dhanasekaran, 2025; George & Wooden, 2023; Sposato, 2025). Hence, without adequate training AI tools may remain under-utilised or misapplied.

Adoption of human-AI in smart classrooms depends on how instructional leaders create conducive learning environments, communicate shared vision and inspire lecturers to develop interest in integrating AI-powered learning tools in the teaching-learning process. Research has empirically proven that digital instructional leadership significantly predicts educators' AI integration (Atchley et al., 2024; Bixler & Ceballos, 2025). Similarly, Chen et al. (2020) found that lecturers who receive continuous professional development in digital technologies are more likely to adopt innovative teaching practices and integrate AI tools into their instructional delivery. Berkovich and Hassan (2023) discovered that instructional leaders create enabling conditions for technology integration by promoting collaborative practices. These findings have proven that instructional leadership directly influences instructional classroom practices. Existing studies have shown that instructional leadership is a critical factor for promoting the adoption of AI innovations (Hsieh et al., 2026), equipping teachers with the skills needed for human-AI collaboration (Zeng et al., 2025), fostering professional learning communities that enable teachers to collaboratively explore AI tools (Liu et al. 2024; Ukala & Adieme, 2025) and enhancing self-efficacy through hands-on pedagogical engagement with AI tools (Zhang, 2023). Thus, instructional leadership plays a crucial role in

ensuring that learning remains human-centred, supporting lecturers' adaptation to smart education and facilitating the effective implementation of policies on human-AI collaboration in smart classrooms.

From Human-AI Policy to Practice in Nigerian Universities

Translating human-AI policy into practice in Nigerian universities requires deliberate and systematic curriculum implementation that responds to the pedagogical demands of AI integration and global best practices. When institutional policies are operationalised through clear instructional frameworks, they enhance the teaching and learning process (El-Samaty & Albadi, 2026; Sposato, 2025). Instructional leadership therefore, plays a pivotal role in bridging the gap between policy formulation and curriculum implementation by aligning institutional AI policies with pedagogical goals (Bixler & Ceballos, 2025; He et al., 2025; Obasi & Adieme, 2023; Hsieh et al., 2026). Consequently, the successful translation of policy into practice in human-AI collaborative smart classrooms depends largely on how institutional leaders implement these policies through continuous professional development, effective supervision of instruction, provision of adequate resources and the promotion of collaborative decision-making. These strategies are essential for creating enabling conditions that ensure AI integration is not only technically feasible but also pedagogically meaningful and contextually relevant to learners.

Statement of the Problem

The rapid evolution of generative AI and its growing use in education have become major concerns in national and global educational discourse. Educational stakeholders argue that higher education institutions, particularly universities must review their pedagogical systems to ensure that AI remains a tool for improving teaching and learning rather than replacing human intellectual engagement. More worrisome is the rate at which intelligent systems are taking over cognitive tasks that traditionally require human reasoning, creativity, analytical and critical thinking. This trend, no doubt, may turn learners into passive recipients of AI-generated content, and reduce their active engagement in learning. Such overdependence may weaken students' intellectual prowess, compelling the knowledge-based society to lose hope in the future generation, and question the declining standard of education. Thus, this raises serious concerns about the quality of undergraduates' universities will produce in the near future.

Furthermore, AI learning tools appear to be adopted in many universities without a coordinated institutional framework to guide their pedagogical use. This has resulted in situations where AI is gradually shifting from being a learning support tool to becoming the main source of students' intellectual work. For instance, some students seem to use AI tools to generate assignments, seminar papers and even answers to questions that require independent critical thinking. Students' over-reliance on AI to think, write, analyse, solve

problems and produce academic work, among others, may turn the classroom spaces into spaces of AI dominance. The situation is further compounded by the different ways lecturers respond to AI use. Some lecturers appear to use AI without sufficient guidance on how such tools should complement their intellectual engagement. Evidence from the researcher's classroom experiences further suggests that institutional leadership structures have not fully adapted to the demands of AI-driven pedagogy. Hence, this raises a critical question about how institutional leadership can ensure that smart classrooms remain human-centred and pedagogically coordinated. The gap between AI pedagogy policies and their implementation in university classrooms therefore remains a major problem that needs to be addressed.

Aim and Objectives of the Study

The aim of this study was to establish the relationship between institutional leadership and human-AI collaborative smart classrooms in public universities in Ekiti State, Nigeria. Specifically, the study sought to:

1. determine the relationship that exists between supportive learning environment and human-AI collaborative smart classrooms in public universities in Ekiti State; and
2. examine the relationship that exists between staff capacity building and human-AI collaborative smart classrooms in public universities in Ekiti State, Nigeria.

Research Questions

The following research questions guided this study:

1. What is the relationship that exists between supportive learning environment and human-AI collaborative smart classrooms in public universities in Ekiti State, Nigeria?
2. What relationship exists between staff capacity building and human-AI collaborative smart classrooms in public universities in Ekiti State, Nigeria?

Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance:

Ho_1 There is no significant relationship between supportive learning environment and human-AI collaborative smart classrooms in public universities in Ekiti State, Nigeria.

Ho_2 There is no significant relationship between staff capacity building and human-AI collaborative smart classrooms in public universities in Ekiti State, Nigeria.

Methodology

This study adopted a cross-sectional correlational research design. This design is appropriate because it allows the researcher to examine the relationships among the variables simultaneously at a single point in time without manipulating any of the variables. The population comprised all 581 academic staff (217 males and 364 females)

from the Faculties of Education in the three public universities in Ekiti State (Academic Personnel Unit, 2025). The universities are: Federal University Oye-Ekiti (FUOYE), Ekiti State University (EKSU) and Bamidele Olumilua University of Education, Science and Technology (BOUESTI). Taro Yamane's formula was used to determine a minimum sample size of 237**;** hence, a sample of 250 academic staff, which represents 43% of the population was drawn using multi-staged sampling procedure. First, the public universities in Ekiti State were purposively selected based on their ownership and relevance to the study context. Secondly, faculties and departments within the universities were stratified to ensure representation across disciplines. Finally, a proportionate random sampling technique was used to select the sample. Two self-developed structured scales were used as instruments for data collection: Institutional Leadership Scale (ILS) and Human-AI Collaborative Smart Classrooms Scale (HAICSCS) were used for data collection. ILS contained 27 items with fifteen items and twelve items for the two constructs (supportive learning environment and staff capacity building), while HAICSCS contained 10 items which measured human-AI collaborative smart classrooms. The questionnaire items were structured on a 4-point rating of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD), and weighted 4, 3, 2 and 1 respectively.

The instruments were subjected to face and content validation by five experts in the Departments of Educational Technology and Educational Management, Faculty of Education, Federal University Oye-Ekiti. The experts examined the instruments to determine the clarity, relevance, adequacy and appropriateness of the items in relation to the study objectives and constructs. The internal consistency of the instruments was determined using the Cronbach Alpha method. The reliability analysis yielded coefficient values of 0.84 for the ILS and 0.79 for the HAICSCS, with an overall reliability index of 0.82. Pearson's Product Moment Correlation Coefficient was used to answer the research questions and test the null hypotheses at the 0.05 level of significance using SPSS Statistics version 23. In answering the research questions, the coefficient r and the strength of the relationship were interpreted using the correlation coefficient scale proposed by Creswell (2014) as follows: 0.00-0.19 = weak correlation, 0.20-0.39 = fair correlation, 0.40-0.69 = moderate correlation, 0.70-0.89 = strong correlation, and 0.90-1.00 = very strong correlation.

Results

Table 1: Pearson's Product Moment Correlation Coefficient Analysis of Respondents' Opinions on the Relationship between Supportive Learning Environment and Human-AI Collaborative Smart Classrooms in Public Universities in Ekiti State

Variables	N	$\overline{X}$	SD	*R*	*P*	Decision
Supportive Learning Environment	250	48.70	4.86	.164	.009	Significant Positive Relationship
Human-AI Collaborative Smart Classrooms	250	37.22	1.62			

* Correlation coefficient is significant at p < 0.05

Table 1 presents the mean, standard deviation and Pearson's Product Moment Correlation analysis between supportive learning environment and human-AI collaborative smart classrooms. The results revealed that supportive learning environment had a mean score of 48.70 with a standard deviation of 4.86, while human-AI collaborative smart classrooms had a mean score of 37.22 with a standard deviation of 1.62 among the 250 respondents. The correlation (r) of .164 showed that there is a positive relationship between supportive learning environment and human-AI collaborative smart classrooms. The probability value of .009 is less than the 0.05 level of significance, indicating a positive and significant relationship. Therefore, the null hypothesis which states that there is no significant relationship between supportive learning environment and human-AI collaborative smart classrooms is rejected. Thus, there is a significant positive relationship between supportive learning environment and human-AI collaborative smart classrooms in public universities in Ekiti State, Nigeria.

Table 2: Pearson's Product Moment Correlation Coefficient Analysis of Respondents' Opinions on the Relationship between Staff Capacity Building and Human-AI Collaborative Smart Classrooms in Public Universities in Ekiti State

Variables	N	$\overline{X}$	SD	*R*	*p*	Decision
Staff Capacity Building	250	45.76	1.78	.130	.040	Significant Positive Relationship
Human-AI Collaborative Smart Classrooms	250	37.22	1.62			

* Correlation coefficient is significant at p < 0.05

Table 2 displays mean, standard deviation and Pearson's Product Moment Correlation analysis between staff capacity building and human-AI collaborative smart classrooms. The results showed that staff capacity building had a mean score of 45.76 with a standard deviation of 1.78, while human-AI collaborative smart classrooms had a mean score of 37.22 with a standard deviation of 1.62 among the 250 respondents. The correlation (r) of .130 revealed that there was a positive relationship between staff capacity building and human-AI collaborative smart classrooms. The p-value of .040 is less than the 0.05 level of significance, indicating a positive and significant relationship. Therefore, the null hypothesis which states that there is no significant relationship between staff capacity building and human-AI collaborative smart classrooms is rejected. Hence, there is a significant positive relationship between staff capacity building and human-AI collaborative smart classrooms in public universities in Ekiti State, Nigeria.

Discussion of Findings

The finding of this study revealed a positive and significant relationship between supportive learning environment and human-AI collaborative smart classrooms. This implies that when lecturers are provided with a supportive learning environment as well as adequate learning facilities, they will be more effective and confident in integrating AI tools to promote active teaching and learning in the classroom. This is in agreement with Eleje et al. (2025); Ghamrawi et al. (2026); Sposato (2025); Zawacki-Richter et al. (2024), who discovered in their various studies that provisions of supportive learning environments foster more inclusive classrooms where learners with diverse abilities progress at their pace. The finding is also in consonance with Chen et al. (2020); Dai et al. (2025); Jiao et al. (2022); Pietsch and Mah (2023), who observed that the effectiveness of human-AI collaborative smart classrooms is strongly influenced by the quality of the learning environment, access to digital infrastructure and AI tools. This study corroborates the findings of Ocen et al. (2025) who reported that institutional leaders who create supportive learning environments inspire lecturers to explore multiple teaching strategies that meet students' diverse learning needs.

Another finding of the study revealed a positive and significant relationship between staff capacity building and human-AI collaborative smart classrooms. This implies that as lecturers receive more training on the human-centred use of AI, they become more competent and versatile in utilising AI tools to actively engage students in classroom activities. This finding agrees with Nzokurum and Adieme (2023); Zawacki-Richter et al. (2019), who found that capacity building is critical in the education system because it determines how well lecturers can integrate new digital tools into classroom practices, and adapt to changing instructional demands. It is also in line with Atchley et al. (2024); Dhanasekaran (2025); George and Wooden 2(023); El-Samaty and Albadi

(2026); Holmes et al. (2022), who observed that when lecturers are guided on how to use AI-learning tools effectively and ethically, they will enhance their instructional practices, integrate AI meaningfully into teaching, and improve student engagement and learning outcomes. The finding of this study is consistent with those of Berkovich and Hassan (2023); Bixler and Ceballos (2025); Chen et al. (2020), who discovered that digital instructional leadership significantly predicts teachers' AI integration. The finding of this study also supports the results of Hsieh et al. (2026); Zeng et al. (2025), who found that instructional leadership plays a crucial role in supporting lecturers' adaptation to smart education, and facilitating the effective implementation of policies on human-AI collaboration in smart classrooms.

Conclusion

Based on the findings of this study, it is therefore concluded that institutional leadership is critical in bridging the gap between policy formulation and the implementation of AI-driven classroom practices in public universities in Ekiti State, Nigeria. Institutional AI-pedagogy policies provide guidelines for both lecturers and students on how to collaboratively use AI in smart classrooms. Lecturers are inspired to improve their pedagogy and embrace modern technologies when they perceive strong institutional support. Likewise, students can actively engage in interactive and effective learning processes while using AI appropriately. Hence, strong institutional leadership fosters innovation, improves instructional delivery and promotes effective human-AI collaboration in university classrooms.

Recommendations

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

1. University administrators should always endeavour to provide supportive learning environments, and enforce policies on AI integration that promote human-centred approaches in order to meet the demands of the Fifth Industrial Revolution.
2. Lecturers should be encouraged to engage in continuous professional development (CPD) programmes that are aligned with emerging generative AI technologies in education to enhance their pedagogical competence.

Ethical Considerations

Ethical considerations were observed throughout the study. Participation was voluntary, and respondents were assured of the confidentiality and anonymity of their responses. Informed consent was obtained prior to data collection, and the data were used strictly for academic purposes.

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