

CLASSROOM ENVIRONMENT AS A CORRELATE OF TEACHERS' ADOPTION OF ARTIFICIAL INTELLIGENCE (AI) IN PUBLIC SECONDARY SCHOOLS IN IRELE LOCAL GOVERNMENT AREA OF ONDO STATE

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Abstract

This study investigated the relationship between classroom environment and teachers' adoption of AI in public secondary schools in Irele Local Government Area of Ondo State. Five research questions and five hypotheses guided the study. The population of the study was 213 made up of 193 teachers, 10 principals and 10 vice-principals of the 10 public secondary schools in the LGA. Census sampling technique was used to select the entire population as sample. Two structured instruments titled Classroom Environment Questionnaire (CEQ), and Teachers Artificial Intelligence Adoption Questionnaire (TAIAQ) constructed by the researcher were used for data collection. The instruments were face validated by three experts from the Faculty of Education, University of Nigeria, Nsukka. Internal consistency reliability test was done using Cronbach Alpha formula and the average coefficient for CEQ clusters was 0.88 and for TAIAQ was 0.91. Linear regression was used to answer research questions 1-4, and multiple regression was used to answer research question 5. Also, t-test associated with linear regression was used to test hypotheses 1-4, and Analysis of Variance (ANOVA) associated with multiple regression was used to test hypothesis 5 all at 0.05 level of significance. The study found that classroom environment has positive correlation with teachers' adoption of AI. The physical, instructional, psychological and social environment of the classroom all have correlation with teachers' adoption of AI. The researcher recommended that Government should provide befitting and technology-enabled infrastructure, principals and teachers should ensure quality instructional delivery and adequate use of instructional materials in the classroom, and government should always recruit qualified teachers and also all the teachers should be trained on the use of assistive technology.

Keywords: Classroom environment, teachers, adoption, artificial intelligence (AI)

Introduction

One of the contemporary developments in education practice is the infusion of assistive technology into teaching and learning, and the most widely discussed is artificial intelligence (AI), which also has emerged as a dominant topic in educational research. AI refers to the simulation of human intelligence processes by machines, especially computers and the primary goal of AI is to create systems capable of performing tasks that typically require human intelligence, such as visual perception, speech recognition, decision-making, language translation, and more. Kendrill (2024) defined AI as a set of technologies that enable computers to perform a variety of advanced functions, including the ability to see, understand and translate spoken and written language, analyze data and make recommendations. AI is now being applied in education to aid quality teaching and learning and tasks meant for the teachers or the learners as the case may be is being taken up by the computer. AI has many components and each one is supportive to quality education. The main components of AI as catalogued by Mitchell (2024) are: Speech Recognition (SR), Machine Learning (ML), Deep Learning, Computer Vision (CV), Robotics, Natural Language Processing (NLP) and Expert Systems (ES).

These components support education in areas of personalized learning, curriculum development, teachers' development, support for learners with disability, support for research, increase in digital knowledge among learners and educators. According to Okunade (2024), AI in education is the application of sophisticated technology, namely machine learning algorithms and computational models, to enhance the learning process, boost educational results, and customize instruction to meet the unique requirements of each student. The application of AI in education is in cohesion with FRN (2013) which stated that modern educational techniques shall be increasingly used and improved upon at all levels of the education system. One of the key remarks on application of AI in education was given by UNESCO (2025), the organization submitted that AI has the potential to address some of the biggest challenges in education today, innovate teaching and learning practices, and accelerate progress towards sustainable development goals - 4, (SDG-4), which is quality education. While there are several educational applications of AI in education, its full potential is yet to be fully harnessed in instructional settings, unlike in the business domains. Ayanwale, Adelana and Odufuwa (2024) asserted that given the speed at which AI is advancing, it would be illogical to conclude that it will not significantly impact the education sector in a few years to come, based on the several possibilities of the technology and its mind-blowing advancements in education. However, scholars have noted that institutional and environmental factors within schools may play a significant role in shaping teachers' disposition toward emerging technology such as AI. One of such environmental factors is the classroom.

The classroom environment refers to the overall conditions, atmosphere, and surroundings in which teaching and learning take place. This study focused on the physical, instructional, psychological and the social environment of the classroom as they relate with teachers' adoption of AI. As Jones and Barletti (2024) submitted, the classroom environment is the physical setting, combined with the psychological, social, and instructional experiences related to teacher-student characteristics and behaviours.

The physical classroom environment refers to the physical conditions and resources within a classroom, such as space, furniture, lighting, ventilation, and technological facilities. These features shape the comfort, interaction, and effectiveness of teaching and learning activities. Dimitriadou and Lanitis (2023) noted that effective AI adoption in education requires smart physical classroom environments equipped with appropriate technological infrastructure and digital learning resources. Similarly, Zhang and Ding (2024) observed that technology-assisted classrooms enhance student engagement and support AI-powered teaching and learning processes. In the Nigerian context, Bali and Garba (2024) emphasized the importance of adequate infrastructural facilities, including internet access and digital technologies, for successful AI integration in schools. Similarly, the instructional classroom environment as highlighted by Holmes and Bialik (2019) and corroborated by Zawacki-Richter and Marin (2019) focuses on the teaching method used, classroom rules and routines, feedback, tests and assessments. The effective instructional classroom environment for AI adoption is characterized by learner-centered teaching strategies, technology-integrated instruction, and opportunities for critical thinking and problem-solving. Such an environment enables teachers and students to effectively utilize AI tools to enhance teaching, learning, and personalized educational experiences.

Furthermore, the psychological classroom environment refers to the emotional and mental atmosphere of the classroom as perceived by teachers and students. According to Viberg and Cucurova (2024), it encompasses feelings of safety, trust, belonging, respect, support, motivation, and well-being that influence learning and teaching behaviours. Xu,

Khan and Shahzad (2024) contended that one key determinant influencing adoption and usage of AI is technology self-efficacy, which refers to an individual's trust in their ability to use technology to achieve desired outcomes. Higher levels of trust have been associated with increased motivation to learn and use technology, leading to more frequent and proficient usage of AI.

Equally, the social classroom environment refers to the quality of interpersonal relationships, collaboration, communication, and social support among teachers and students within the classroom setting. According to Ertmer and Ottenbreit-Leftwich (2010), supportive professional relationships and collaborative school cultures play a crucial role in teachers' adoption of educational technologies. When teachers operate in environments that encourage peer interaction and professional collaboration, they are more likely to develop confidence in using emerging technologies and integrate them into their instructional practices. Taken together, Holmes and Bialik noted that the successful implementation of AI in education depends not only on technological infrastructure but also on social factors that promote experimentation, collaboration, and continuous learning among educators. Government of various states in Nigeria adopting AI in schools is a step in keeping up with developmental trends and Ondo State is not left out, with the initiative planned to be extended to Irele local government area, which is one of the eighteen local governments areas in the state. Establishing the relationship between the classroom environment and AI adoption in the public secondary schools in the local government area is significant because the conditions within the learning setting could influence teachers' and students' willingness and ability to engage with emerging technologies.

Statement of the Problem

Government is planning the adoption of AI in the public secondary schools in Irele LGA of Ondo State, while the physical condition of the classrooms is poor, buildings have become dilapidated, there are no doors and windows, no electricity supply in the classrooms, no internet access, the instructional state of the classrooms is equally bad as there are no adequate instructional materials, the ones available are obsolete, teachers still use blackboards instead of smartboards, most teachers are not computer literates. The emotional state of the teachers has shown low confidence, vulnerability and lack of motivation. This study investigated the possibility of the government to successfully introduce AI in the schools ignoring the poor state of the classroom environment.

Purpose of the Study

The main purpose of the study was to determine the relationship between the classroom environment and teachers' adoption of artificial intelligence (AI) in public secondary schools in Irele local government area of Ondo State. Specifically, the study sought to determine the;

1. relationship between the physical classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State.
2. relationship between the instructional classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State.
3. relationship between the psychological classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State.
4. relationship between the social classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State.
5. joint relationship between the classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State.

Research Questions

The following research questions guided the study:

1. What is the relationship between the physical classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State?
2. What is the relationship between the instructional classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State?
3. What is the relationship between the psychological classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State?
4. What is the relationship between the social classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State?
5. What is the joint relationship between the classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State?

Hypotheses

The following null hypotheses guided the study and were tested at 0.05 level of significance:

H₀₁: There is no significant relationship between the physical classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State.

H₀₂: There is no significant relationship between the instructional classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State.

H₀₃: There is no significant relationship between the psychological classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State.

H₀₄: There is no significant relationship between the social classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State.

H₀₅: There is no significant joint relationship between the classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State.

Methods

The study adopted correlational survey research design. The area of the study was Irele Local Government Area of Ondo State, which is one of the eighteen local government areas in the state. The local government area is made up of 6 main towns which are Ode-Irele, Ode-Ajagba, Ode-Omi, Ode-Iyansan, Akotogbo, and Iju-Osun. There are 10 public secondary schools in the area. The population of the study was 213 which comprised 193 teachers, 10 principals and 10 vice-principals of the 10 public secondary schools in the local government area. A census sampling technique was applied to draw the entire population as sample. Two instruments titled Classroom Environment Questionnaire (CEQ), and Teachers Artificial Intelligence Adoption Questionnaire (TAIAQ) constructed by the researcher were the instruments used for data collection. The instruments were structured in line with Likert four-point response options of Strongly Agree (4), Agree (3), Disagree (2) and Strongly Disagree (1) with response options ranging from the highest weight 4 to 1 respectively. The CEQ had 4 clusters of 10 items

each, while the TAI AQ had 10 items on a single cluster. The instruments were face validated by three specialists, two from educational administration and planning unit, and one from measurement and evaluation unit, all from the faculty of education, University of Nigeria, Nsukka. To determine the internal consistency of the instruments, a reliability test was carried out using Cronbach Alpha formula and the reliability index obtained for the clusters in CEQ were 0.84, 0.87, 0.92, and 0.87 respectively, an overall reliability index of 0.88 was obtained, and TAI AQ had a reliability index of 0.91. Linear regression was used to answer research questions 1-4, and multiple regression was used to answer research question 5. The benchmark decision rule adopted was coefficient of correlation (R) 0.8 -1, very high correlation; R of +0.60 - 0.79, high correlation; 0.4 – 0.59, moderate correlation; R of 0.39 - 0.20, low correlation, 0.19 and below, very low correlation. A value of R close to -1 shows that variables are uncorrelated. Also, t-test associated with linear regression was used to test hypotheses 1-4, and the Analysis of Variance (ANOVA) associated with multiple regression was used to test hypothesis 5 all at 0.05 level of significance.

Results

Research Question 1: What is the relationship between the physical classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State?

Table 1: Linear regression analysis of the relationship between the physical classroom environment and teachers' adoption of AI

Model	N	R	R ²	Adjusted R Square	Decision
1	213	.82 ^a	.67	0.66	Very high positive relationship

Key: N = Number of respondents, R=Correlation coefficient, R² = Coefficient of determination

- a. Dependent variable: AI Adoption
- b. Predictor: (Constant) Physical Classroom Environment

The result in Table 1 indicated that the regression co-efficient was R (.82) which revealed that there exists a very high positive relationship between the physical classroom environment and teachers' adoption of AI in public secondary schools. This implies that the more conducive the physical environment of the classroom is, the more adaptable the classroom is for teachers' adoption of AI. The co-efficient of determination R² (.67) indicated that 67% of teachers' readiness to adopt AI is attributable to the adaptable nature of the physical environment of the classroom. Thus, 33% of the variations was attributed to extraneous factors not explained by the model.

H₀₁: There is no significant relationship between the physical classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State.

Table 2: t-test associated with linear regression analysis of the relationship between the physical classroom environment and teachers' adoption of AI

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	8066.39	1	8066.39	2335.13	.001 ^b
	Residual	1029.40	211	3.45		
	Total	9095.79	212			

Data in Table 2 revealed that the t-test associated with the linear regression was $F_{(1,211)} = 2335.13$; $t(211) = 48.32$, $p < .001$. Since: $p < 0.05$, the null hypothesis was rejected. Therefore, there is a significant relationship between the physical classroom

environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State.

Research Question 2: What is the relationship between the instructional classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State?

Table 3: Linear regression analysis of the relationship between the instructional classroom environment and teachers' adoption of AI

Model	N	R	R ²	Adjusted R Square	Decision
1	213	.79 ^a	.62	0.61	High positive relationship

a. Dependent variable: AI Adoption

b. Predictor: (Constant) Instructional Classroom Environment

Result in Table 3 indicated that the regression co-efficient was R (.79) which showed that there exists a high positive relationship between the instructional classroom environment and teachers' adoption of AI in public secondary schools. This implies that the more quality and up-to-date the instructional environment of the classroom is, the more adaptable the classroom is for teachers' adoption of AI. The co-efficient of determination R² (.62) indicated that 62% of teachers' readiness to adopt AI is attributable to the adaptable nature of the instructional environment of the classroom. Thus, 38% of the variations was attributed to extraneous factors not explained by the model.

H₀₂. There is no significant relationship between the instructional classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State.

Table 4: t-test associated with linear regression analysis of the relationship between the instructional classroom environment and teachers' adoption of AI

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	8863.51	1	8863.51	11371.11	.001 ^b
	Residual	232.28	211	.78		
	Total	9095.79	212			

Data in Table 4 revealed that the t-test associated with the linear regression was $F_{(1,211)} = 11371.11$; $t(211) = 106.64$, $p < .001$. Since: $p < 0.05$, the null hypothesis was rejected. Therefore, there is a significant relationship between the instructional classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State.

Research Question 3: What is the relationship between the psychological classroom environment and teachers' adoption of AI in public secondary schools in Irele Local government area of Ondo State?

Table 5: Linear regression analysis of the relationship between the psychological classroom environment and teachers' adoption of AI

Model	N	R	R ²	Adjusted R Square	Decision
1	213	.74 ^a	.55	0.54	High positive relationship

a. Dependent variable: AI Adoption

b. Predictor: (Constant) Psychological Classroom Environment

Result in Table 5 indicated that the regression co-efficient was R (.74) which revealed that there is a high positive relationship between the psychological classroom

environment and teachers' adoption of AI in public secondary schools. This implies that the more motivational the psychological environment of the classroom is, the more adaptable the classroom is for teachers' adoption of AI. The co-efficient of determination R^2 (.55) indicated that 55% of teachers' readiness to adopt AI is attributable to the adaptable nature of the psychological environment of the classroom. Thus, 45% of the variations were attributed to extraneous factors not explained by the model.

H₀₃: There is no significant relationship between the psychological classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State.

Table 6: t-test associated with linear regression analysis of the relationship between the psychological classroom environment and teachers' adoption of AI

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8875.49	1	8066.39	12006.04	.0001 ^b
	Residual	220.30	211	.74		
	Total	9095.79	212			

Data in Table 6 revealed that the t-test associated with the linear regression was $F_{(1,211)} = 12006.04$; $t(211) = 109.57$, $p < .0001$. Since: $p < 0.05$, the null hypothesis was rejected. Therefore, there is a significant relationship between the psychological classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State.

Research Question 4: What is the relationship between the social classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State?

Table 7: Linear regression analysis of the relationship between the social classroom environment and teachers' adoption of AI

Model	N	R	R ²	Adjusted R Square	Decision
1	213	.57 ^a	.32	0.31	Moderate positive relationship

a. Dependent variable: AI Adoption

b. Predictor: (Constant) Social Classroom Environment

Result in Table 7 showed that the regression co-efficient was R (.57) which indicated that there is a moderate positive relationship between the social classroom environment and teachers' adoption of AI in public secondary schools. This implies that the more friendly the social environment of the classroom is, the more adaptable the classroom is for teachers' adoption of AI. The co-efficient of determination R^2 (.32) indicated that 32% of teachers' readiness to adopt AI is attributable to the adaptable nature of the social environment of the classroom. Thus, 68% of the variations was attributed to extraneous factors not explained by the model.

H₀₄: There is no significant relationship between the social classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State.

Table 8: t-test associated with linear regression analysis of the relationship between the social classroom environment and teachers' adoption of AI

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8684.78	1	8684.78	6296.69	.0001 ^b

Residual	411.02	211	1.38
Total	9095.79	212	

Data in Table 8 revealed that the t-test associated with the linear regression was $F_{(1,211)} = 6296.69$; $t(211) = 79.35$, $p < .0001$. Since: $p < 0.05$, the null hypothesis was rejected. Therefore, there is a significant relationship between the social classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State.

Research Question 5: What is the joint relationship between the classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State?

Table 9: Multiple regression analysis of the joint relationship between the classroom environment and teachers' adoption of AI

Model	N	R	R ²	Adjusted R Square	Decision
1	213	.78 ^a	.61	0.60	High positive joint relationship

a. Dependent variable: AI Adoption

b. Predictor: (Constant) Physical, Instructional, Psychological, Social

The result in Table 9 suggested that the regression co-efficient was R (.78) which established that there is a high positive joint relationship between the classroom environment and teachers' adoption of AI. This implies that the more enabling the classroom environment is, the more adaptable the classroom is for teachers' adoption of AI. The co-efficient of determination R² (.61) indicated that 61% of teachers' readiness to adopt AI is attributable to the classroom environment. Thus, 39% of the variations was attributed to extraneous factors not explained by the model.

H₀₅: There is no significant joint relationship between the classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State.

Table 10: ANOVA associated with multiple regression analysis on the joint relationship between the classroom environment and teachers' adoption of AI

Model	Sum of Squares	df	Mean Square	F	Sig.
1. Regression	8967.95	4	1793.59	4124.73	.000 ^b
Residual	127.84	208	.44		
Total	9095.79	212			

Data presented in Table 10 showed that the t-test associated with the linear regression was $F_{(4,211)} = 4124.73$; $p < .001$. Since: $p < 0.05$, the null hypothesis was rejected. Therefore, there is a highly statistically significant joint relationship between the classroom environment and teachers' adoption of AI in public secondary schools in Irele local government area of Ondo State.

Discussion of Findings

The findings demonstrated that there is a very high positive relationship between the physical classroom environment and teachers' adoption of AI. The reason for this finding might be that a supportive physical classroom environment for AI adoption is characterized by reliable internet connectivity, adequate power supply, access to digital devices, and flexible learning spaces that facilitate technology use. Such conditions enable teachers and students to interact effectively with AI tools, reducing technical barriers to implementation. This finding is in consonance with Dimitriadou, and Lanitis (2023) who

reported that smart classrooms require adequate technological infrastructure, digital tools, and supportive learning spaces for effective AI integration. This is also supported by Zhang and Ding (2024) which found that technology-assisted classroom environments enhance teaching, learning, student engagement, and AI-supported educational activities.

This study revealed a high positive relationship between the instructional classroom environment and teachers' adoption of AI in public secondary schools. This finding may not be unconnected to the fact that AI adoption in education is mostly learner-centered and encourages innovative, technology-integrated teaching strategies. This makes it easier for teachers to align AI tools with lesson objectives, thereby improving teaching effectiveness and student learning outcomes. This finding is in line with Holmes and Bialik (2019), and Zawacki-Richter and Marin (2019), which reported that instructional methods always align with supportive technologies.

This study revealed that the psychological environment of the classroom has a moderate positive relationship with teachers' adoption of AI in public secondary schools. This might be because the psychological state of the teachers such as confidence and self-efficacy, emotional safety, motivation to innovate, openness to change, and reduced technology anxiety have to be in good state before adoption of AI in the classroom. This is in agreement with the findings of Ayanwale, Adelana, and Odufuwa (2024), and Viberg and Cucurova (2024) revealed that factors such as anxiety, perceived benefits, and preferred methods to enhance trust significantly influence teachers' trust in AI technologies.

The finding of this study suggested that there is moderate positive relationship between the social classroom environment and teachers' adoption of AI in public secondary schools. This can be attributed to the fact that collaborative professional cultures and positive social interactions within educational settings promote technology acceptance and innovation among teachers. Teachers are more willing to adopt AI when they receive encouragement from colleagues, school leaders, and students, and when there are opportunities for training on technology integration. This finding conforms with reports from Ertmer and Ottenbreit-Leftwich (2010), Holmes and Bialik (2019), and Zawacki-Richter and Marin (2019), these different studies found that social interactions among teachers promote professional development and technological acceptance.

Conclusion

Based on the findings of the study, it was concluded that the classroom environment, comprising the physical, instructional, psychological, and social environments has positive relationship with the adoption of AI in public secondary schools in Irele Local Government Area of Ondo State. Therefore, improving the state of the infrastructure and making the classroom environment technology friendly would enhance effective adoption and utilization of AI in teaching and learning processes in the schools.

Recommendations

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

1. Government should elevate the physical status of the classroom by making it technology-supportive, and providing befitting infrastructure, stable electricity, proper ventilation, and flexible seating arrangement.
2. The principals and teachers should work on ensuring quality instructional delivery and adequate use of instructional materials in the classroom.
3. Government to ensure that qualified teachers are recruited into the schools and proper training on the use of assistive technology in the classroom is provided.
4. Teachers should promote confidence, motivation, emotional safety and positive attitudes towards assistive-technology in the classroom.

5. The principals should ensure that the social environment of the classroom is characterized by cooperation, inclusiveness, mutual respect and positive interpersonal relationships that will encourage teachers and learners to engage confidently with AI.

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