INFLUENCE OF ARTIFICIAL INTELLIGENCE ON THE QUALITY OF TEACHING AND LEARNING IN PUBLIC UNIVERSITIES IN ANAMBRA STATE

Dr. Helen Chinelo Onuora
Department of Educational Management and Policy Faculty of Education
Nnamdi Azikiwe University Awka, Anambra State.
Email: hc.onuorah@unizik.edu.ng

&

Dr. Helen Chibuogwu Enwezor
Department of Educational Foundations
Faculty of Education Chukwuemeka Odumegwu Ojukwu University
Igbariam Campus Anambra State – Nigeria.
Email: chiogewino@gmail.com

Abstract

The study investigated the influence of artificial intelligence systems on quality of teaching and learning in public universities in Anambra State. Two research questions guided the study and two hypotheses were tested at 0.05 level of significance. The correlational research design was used for the study. The population of the study comprised 74 lecturers of the Department of Educational Management and Policy or Department of Educational Foundations from two public universities in Anambra State. The instrument for data collection was a validated questionnaire. The instrument was pilot tested and the application of Statistical Package for Social Sciences (SPSS) version 21 using Cronbach Alpha reliability method on the data obtained yielded reliability co-efficient value of 0.87 for cluster A and 0.77 for cluster B with an overall coefficient value of 0.82 for QAI and 0.85 for QTLUQ. Pearson Product Moment Correlation analysis was used to analyse data for the study. The findings of the study revealed that intelligent tutoring systems and smart classroom technology have a very high positive relationship on the quality of teaching and learning in public universities in Anambra State. Finding of the study further revealed intelligent tutoring systems and smart classroom technology have a significant influence on the quality of teaching and learning in public universities in Anambra State. Based on these findings, the researchers recommended among others that administrators of public universities should collaborate with private organizations in the area of funding, provision of digital infrastructure and technical support for successful integration of intelligent tutoring systems and smart classroom technologies for teaching and learning.

Keywords: *Artificial Intelligence, Quality, Teaching, Learning, Universities*

Introduction

Education is an important tool for regional and national development. This is because education is an instrument for change and improving the intellectual capacity of citizens. Education also plays a crucial role in shaping people's values, attitudes, and ethical beliefs (World Bank, 2021). Education also helps people become more self-aware and develop their identity, confidence, and resilience. Education in Nigeria is viewed as a crucial component of national development (Adelakun, 2021). In Nigeria, formal education is conducted at the primary, secondary and university level. University education represents the pinnacle of the educational system in the country. These institutions are available to individuals who have completed their secondary education and

provide advanced academic and vocational programmes, research opportunities, and professional training. The study focused on public universities and colleges of education. The primary aim of university education is to provide students with advanced knowledge, skills, and qualifications needed for their chosen fields or careers.

Thus, the realization of the goals of university education in Nigeria in general and Anambra State in particular is dependent on the availability and utilization of emerging technologies like artificial intelligence.

The concept of artificial intelligence (AI) is swiftly becoming integrated into education. Long and Magerko (2020) defined AI literacy as the ability to understand, apply, monitor, and critically evaluate AI applications without needing to develop the models themselves. The term AI was first mentioned in an internet article in 2015 (Konishi) (Muhammad et al., 2024). Artificial intelligence (AI) is a rapidly evolving technology that is being used in almost every industry, transforming the world. Education is one sector where AI is expected to make big improvements, and is already doing so in several cases. Bobarjo et al. (2023) defined AI as the emulation of human intelligence using software-coded heuristics. Artificial intelligence is an area of science that develops and studies devices designed to stimulate human intellect processes. Ogunode et al. (2020) described artificial intelligence as systems that exhibit behaviours frequently associated with human intelligence. The goal of current AI systems, especially learning systems, is to enable computers, robots, and software applications to process information independently and make judgements similar to human cognitive processes. AI in education is a growing trend in learning technology. The primary goal of AI in education is to provide learners with flexible, personalised, and engaging learning experiences in addition to the fundamental automated tasks. Intelligent tutor systems and smart classroom technology are among the most prominent AI in education developments.

Intelligent Tutoring Systems (ITS) are computer-based educational systems that include independent databases or knowledge bases for educational material and instructional methodologies (Alkhatlan & Kalita, 2018). These systems seek to draw inferences about a learner's capacity to comprehend subjects, identify their flaws and strengths, and dynamically alter the learning process. Intelligent tutoring systems consist of four major components: an expert model, a student model, pedagogical information, and an interface (Alrakhawi et al., 2023). The expert model establishes a standard of expert performance against which the learner is assessed. The student's state assessment may impact the system's pedagogical judgements on tutorial techniques, case selection, and curriculum sequencing (Mosa et al., 2018). Ahuja et al. (2022) revealed that intelligent tutoring systems have been used in a variety of educational sectors, including information technology, engineering, languages, mathematics, programming, and medical. There are several technologies available that allow nonprogrammers to design intelligent teaching systems, including web-based and mobile-based applications. Karaci et al (2018) noted that students who utilised intelligent tutoring systems performed better academically than those that depended on conventional educational techniques. In the same vein, smart classroom technology was seen as another form of artificial intelligence.

Smart classrooms are ones that have technology tools to help teachers and students learn more effectively. Smart classrooms as settings in which teaching and learning activities are meant to use technology to solve low educational quality and improve learners' capacity to be self-sufficient in their studies (Zhan et al., 2021). This style to teaching made the school system more interesting to both students and instructors, allowing teachers to use active approaches (Selim et al., 2020). Depending on the available equipment, smart classrooms may be classified as follows: Basic Smart Classes: These classes use basic smart technology such as laptops or PCs, projectors, DVD or VCD players, and a viewing screen. Intermediate Smart Classes: These classes go beyond basic technology, with features including a smart podium with a control panel, as well as a laptop, projector, screen, and DVD or VCD player. Sophisticated Smart Classes: These classrooms have all of the gadgets found in basic and intermediate smart classrooms, but with more sophisticated features and the use of cutting-edge technology (Kambala & Ramakrishna, 2022). Smart classrooms aim to optimise teaching content, promote resource acquisition, improve teacher-student interaction, assess student learning, and take charge of in-classroom teaching (Akhrif et al., 2020; Jin et al., 2019; Zhu et al., 2020). Despite these assertions, the pedagogical advantages of this trend for teachers and its influence on teaching and learning in higher education

remain unclear (Zawacki-Richter et al., 2019). Also the researchers notes that there is a dearth of empirical studies that links the influence of artificial intelligence systems like intelligent tutor systems and smart classroom technology on quality of teaching and learning in university institutions.

Quality is defined as a multidimensional notion that encompasses all functions and activities of the education system, including teaching and learning (Hay, 2018). Quality teaching and learning in vocational education programmes guarantees that students gain information, skills, and competencies relevant to their area of responsibility (Onochie, 2018).

Quality is directly related to the achievement of learning outcomes (knowledge, skills, and competences at the end of the learning process) that meet the expectations of the key stakeholders: students, parents, employers, and the community in general (Ezeofor et al., 2020). Thus, it is therefore imperative to determine the influence of artificial intelligence systems like intelligent tutor systems and smart classroom technology on quality of teaching and learning in public universities in Anambra State.

Statement of the Problem

The quality of public universities has long been a concern within the academia, not only in Nigeria as a whole but specifically in Anambra State. University education is expected to cultivate the human capital of the nation; however, there is apprehension regarding the standard of teaching and learning in these institutions, which appears to fall short of globally accepted norms. This deficiency is evident in the struggle of some graduates from public universities to effectively compete in the global job market. The researchers' questions whether the implementation of AI technologies, such as intelligent tutoring systems and smart classroom technology, could potentially enhance the quality of teaching and learning in public university institutions. Answering this question necessitates empirical investigation, such as the present study conducted by the researchers.

Research Questions

The following research questions guided the study:

What is the influence of intelligent tutoring systems on the quality of teaching and learning in public universities in Anambra State?

What is the influence of smart classroom technology on the quality of teaching and learning in public universities in Anambra State?

Hypotheses

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

Intelligent tutoring systems do not influence the quality of teaching and learning in public universities in Anambra State.

Smart classroom technology does not influence the quality of teaching and learning in public universities in Anambra State.

Method

Correlational research design was adopted for the study. The study was conducted in Anambra State. The population of the study comprised 74 lecturers of the Department of Educational Management and Policy or Department of Educational Foundations from two public universities in Anambra State. The universities are; Chukwuemeka Odumegwu Ojukwu University, Igbariam Campus and Nnamdi Azikiwe University, Awka. Two

questionnaires were used to collect data for the study. The first questionnaire is titled: "Questionnaire on Artificial Intelligence (QAI)." The instrument contains a total of 20 items in two clusters; A and B. Cluster A contains 10 items on intelligent tutoring system while Cluster B contains 10 items on smart classroom technology. The second questionnaire is titled: "Quality of Teaching and Learning in Universities Questionnaire (QTLUQ)." It contains 10 items measuring quality of teaching and learning in universities. Both instruments were structured on a four point rating scale of Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD).

The instrument was validated by three experts; two in the Department of Educational Management and Policy and One in Measurement and Evaluation Unit in the Department of Educational Foundations, Nnamdi Azikiwe University, Awka. A pilot test was conducted on 10 lecturers in Ebonyi State University, Abakaliki. The application of Statistical Package for Social Sciences (SPSS) version 21 using Cronbach Alpha reliability method on the data obtained yielded reliability co-efficient value of 0.87 for cluster A and 0.77 for cluster B with an overall coefficient value of 0.82 for QAI and 0.85 for QTLUQ. Data for the study was administered by the researchers. The instrument was administered to the respondents in their offices. The instrument was administered and retrieved on the spot. Out of 74 copies of questionnaire administered, 64 copies were returned in good condition. The 64 copies of returned questionnaire amounted to 86% questionnaire return rate and the 10 copies of questionnaire not returned amounted to 10% lose rate. Pearson Product Moment Correlation analysis was used to analyse data for the study. In answering the research questions, the coefficient rule was used for judgment as thus: Negligible (0.00- 0.20), Low (0.20 - 0.40), Moderate (0.40- 0.60), Substantial (0.60 - 0.80), and Very High (0.80-1.00). For coefficient (r); + Sign = Positive influence and - Sign = Negative influence.

Result

Research Question 1

What is the influence of intelligent tutoring systems on the quality of teaching and learning in public universities in Anambra State?

Table 1: Summary of Pearson Correlation Analysis o f I n f l u e n c e Intelligent Tutoring Systems on the Quality of Teaching and Learning in Public Universities in Anambra State

		Intelligent Tutoring Systems	Quality of Teaching and Learning	Remark
Intelligent Tutoring Systems	Pearson Correlation	1	.835**	Very High Positive Influence
	Sig, (2-tailed)		.000	
	N	64	64	
Quality of Teaching and Learning	Pearson Correlation	.835**	1	
	Sig, (2-tailed)	.000		
	N	64	64	

** Correlation is significant at the 0.05 level (2-tailed).

Data in Table 1 revealed that the Pearson's Correlation Coefficient is r = .835. This shows that intelligent tutoring systems has a very high positive relationship on the quality of teaching and learning in public universities in Anambra State. This implies that integration of intelligent tutoring systems would improve the quality of teaching and learning in public universities in Anambra State. Thus, intelligent tutoring

systems have a very high positive relationship on the quality of teaching and learning in public universities in Anambra State.

Research Question 2

What is the influence of smart classroom technology on the quality of teaching and learning in public universities in Anambra State?

Table 2: Summary of Pearson Correlation Analysis o f I n f l u e n c e Smart Classroom Technology on the Quality of Teaching and Learning in Public Universities in Anambra State

		Smart Classroom Technology	Quality of Teaching and Learning	Remark
Smart Classroom Technology	Pearson Correlation	1	.775**	High Positive Influence
	Sig, (2-tailed)		.000	
	N	64	64	
Quality of Teaching and Learning	Pearson Correlation	.775**	1	
	Sig, (2-tailed)	.000		
	N	64	64	

** Correlation is significant at the 0.05 level (2-tailed).

Data in Table 2 revealed that the Pearson's Correlation Coefficient is r = .775. This shows that smart classroom technology has a high positive influence on the quality of teaching and learning in public universities in Anambra State. This implies that integration of smart classroom technology would improve the quality of teaching and learning in public universities in Anambra State. Thus, smart classroom technology has a high positive relationship on the quality of teaching and learning in public universities in Anambra State.

Hypothesis 1

Intelligent tutoring systems do not influence the quality of teaching and learning in public universities in Anambra State.

Table 3: Test of Significance of Pearson Correlation on the I n f l u e n c e o f Intelligent Tutoring Systems on the Quality of Teaching and Learning in Public Universities in Anambra State

Correlations

		Intelligent Tutoring Systems	Quality of Teaching and Learning	Remark
Intelligent Tutoring Systems	Pearson Correlation	1	.835**	Significant
	Sig, (2-tailed)		.000	
	N	64	64	
Quality of Teaching and Learning	Pearson Correlation	.835**	1	
	Sig, (2-tailed)	.000		
	N	64	64	

** Correlation is significant at the 0.05 level (2-tailed).

Data presented on Table 3 indicates the correlation coefficient (r) as .835 with a p-value = 0.000. Since the P value of 0.000 is less than .05 (P<.05), which shows that the influence of intelligent tutoring systems on the quality of teaching and learning in public universities in Anambra State is statistically significant. This means that there is a significant influence of intelligent tutoring systems on the quality of teaching and learning in public universities in Anambra State. Thus, the null hypothesis was not accepted.

Hypothesis 2

Smart classroom technology does not influence the quality of teaching and learning in public universities in Anambra State.

Table 3: Test of Significance of Pearson Correlation on the I n f l u e n c e o f Smart Classroom Technology on the Quality of Teaching and Learning in Public Universities in Anambra State

Correlations

		Smart Classroom Technology	Quality of Teaching and Learning	Remark
Smart Classroom Technology	Pearson Correlation	1	.775**	High Positive Influence
	Sig, (2-tailed)		.000	
	N	64	64	
Quality of Teaching and Learning	Pearson Correlation	.775**	1	
	Sig, (2-tailed)	.000		
	N	64	64	

** Correlation is significant at the 0.05 level (2-tailed).

Data presented on Table 4 indicates the correlation coefficient (r) as .775 with a p-value = 0.000. Since the P value of 0.000 is less than .05 (P<.05), which shows that the influence of smart classroom technology on the quality of teaching and learning in public universities in Anambra State is statistically significant. This means that there is a significant influence of smart classroom technology on the quality of teaching and learning in public universities in Anambra State. Thus, the null hypothesis was not accepted.

Discussion

The finding of the study revealed that intelligent tutoring systems have a very high positive relationship on the quality of teaching and learning in public universities in Anambra State. This finding indicates that the integration of intelligent tutoring systems would improve the quality of teaching and learning in public universities in Anambra State. The finding further revealed that there is a significant influence of intelligent tutoring systems on the quality of teaching and learning in public universities in Anambra State. This finding is in agreement with Alrakhawi et al. (2023) who reported that intelligent tutoring system improves the quality of teaching and learning in higher institutions. Ahuja et al. (2022) revealed that intelligent tutoring systems could improve assessment for teachers and fosters personalized learning among students. Karaci et al (2018) asserted that students who utilised intelligent tutoring systems performed better academically than those that depended on conventional educational techniques.

Furthermore, the finding of the study revealed smart classroom technology has a high positive relationship on the quality of teaching and learning in public universities in Anambra State. This finding indicates that the integration of smart classroom technology would improve the quality of teaching and learning in public universities in Anambra State. The finding further revealed that there is a significant influence of smart classroom technology on the quality of teaching and learning in public universities in Anambra State. These

findings are in agreement with Akhrif et al. (2020) who revealed that smart classrooms enhances teaching content, facilitate resource acquisition, enhance teacher-student interaction, evaluate student learning, and oversee in-classroom teaching. Jin et al., (2019) found that the implementation of smart classroom technology significantly improved student engagement and academic performance in a similar context. Similarly, Zhu et al. (2020) reported positive outcomes in terms of student satisfaction and learning outcomes when smart classroom technology was integrated into university courses. These findings suggest a consistent trend across studies, indicating that smart classroom technology indeed enhances the quality of teaching and learning in universities settings.

Conclusion

Based on the findings of the study, the researcher concludes that artificial intelligence has a high positive influence on the quality of teaching and learning in public universities in Anambra State. Intelligent tutoring systems and smart classroom technology have significant influence on the quality of teaching and learning in public universities in Anambra State. It is therefore pertinent that measures are put in place to improve the integration of artificial intelligence on the quality of teaching and learning in public universities in Anambra State.

Recommendations

The following recommendations were made based on the finding of the study:

Administrators of public universities should collaborate with private organizations in the area of funding, provision of digital infrastructure and technical support for successful integration of intelligent tutoring systems and smart classroom technologies for teaching and learning.

Administrators of public universities should organize in-service training programmes like conferences, seminars and workshops where university lecturers would be trained on effective utilization of AI systems like intelligent tutoring systems and smart classroom technologies in universities.

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