



Extent of Artificial Intelligence Integration on Instructional Delivery in Public Universities in Enugu State, Nigeria.

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ABSTRACT

The study determined the extent of artificial intelligence integration on instructional delivery in public universities in Enugu State. Two research questions guided the study while two null hypotheses were tested at 0.05 level of significance. The researcher adopted a descriptive survey research design for this study. The population for the study comprised 2943 (1966 male and 977 female) lecturers. The sample size was 294 respondents which comprised 196 male and 98 female lecturers. The researcher used proportionate sampling technique to draw the sample size. The instrument for data collection was a researcher developed questionnaire titled "Extent of Artificial Intelligence Integration on Instructional Delivery in Public Universities Questionnaire (EAIIDPUQ)". The instrument contained 16 items based on the two research questions. Three experts in Faculty of Education, Enugu State University of Science and Technology validated the instrument. The reliability of the instrument was determined using Cronbach Alpha method which yielded 0.81 for cluster 1 and 0.83 for cluster 2 with an overall reliability index of 0.82 which indicated that the instrument was reliable. Mean scores and standard deviation were used to answer the research questions, while t-test statistic was used to test the hypotheses. The findings of the study showed that to a great extent Intelligent Tutoring Systems and AI-powered Learning Management Systems (LMS) impact the instructional delivery in public universities in Enugu State. In line with the findings, the researcher recommended among others that public universities in Enugu State should allocate more funds to acquire, upgrade, and maintain Intelligent Tutoring Systems and AI-powered LMS.

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INTRODUCTION

Artificial Intelligence (AI) is a branch of computer science that aims to create systems capable of performing tasks that typically require human intelligence. These tasks include learning, reasoning, problem-solving, perception, and language understanding. Russell and Norvig (2021) posited that AI technologies are increasingly being used across sectors such as healthcare, education, finance, and transportation to enhance efficiency and decision-making. Artificial Intelligence (AI), according to Luckin, Holmes, Griffiths and Forcier (2016) has rapidly become a transformative force in education, offering new ways to enhance teaching and learning experiences across the globe. AI-powered systems like intelligent tutoring, adaptive learning platforms, and automated assessment tools are helping to personalize education to meet individual student needs (Holmes, Bialik & Fadel 2019). However, human perceptions about AI in education are mixed, as many educators appreciate its potential benefits but express concerns about losing the human touch in teaching. Despite these concerns, Tuomi (2018) was of the view that the integration of AI continues to grow, driven by its ability to improve efficiency, accessibility, and learning outcomes in diverse educational settings.

Artificial Intelligence (AI) is transforming teaching and learning by enabling personalized learning experiences that adapt to individual student needs (Holmes, et al., 2019). AI-powered platforms like Carnegie Learning and Century Tech analyze student data to provide tailored feedback, improving engagement and achievement. Globally, Roll and Wylie (2016) reported that AI tools are also automating administrative tasks for teachers, allowing them to focus more on instruction and mentorship (Zawacki-Richter, Marin, Bond, & Gouveneur 2019). Virtual tutors and intelligent tutoring systems are bridging educational gaps, especially in underserved regions. Across the world, AI technologies such as intelligent tutoring systems, AI-powered Learning Management Systems (LMS), virtual classrooms, and automated grading are reshaping instructional delivery.

Instructional delivery refers to the methods and techniques used by educators to present content and engage students in the learning process (Slavin, 2018). It involves planning, structuring, and implementing strategies that facilitate effective learning and knowledge retention. Effective instructional delivery ensures that learning objectives are clearly communicated and achieved through engaging teaching strategies. It requires educators to plan, organize, and present content in ways that actively involve students in the learning process (Slavin, 2018). Instructional delivery through AI technologies such as intelligent tutoring systems, AI-powered Learning Management Systems (LMS), virtual classrooms, and automated grading enhances the learning experience by providing

personalized and efficient support to students. For the purpose of this study, the researcher focused on intelligent tutoring systems, AI-powered Learning Management Systems (LMS) to determine its impact on instructional delivery in public universities.

Intelligent Tutoring Systems (ITS) are AI-driven platforms that simulate personalized one-on-one tutoring by providing real-time feedback and adjusting to students' individual learning needs (VanLehn, 2011). These systems use algorithms to assess student performance, offer targeted interventions, and promote mastery of specific concepts. Research has shown that ITS can significantly improve learning outcomes by providing immediate and tailored feedback, enhancing student engagement and retention (VanLehn, 2011). AI offers opportunities for customized instruction, efficient classroom management, and data-driven decision-making, all crucial for modern educational delivery (Holmes et al., 2019). Both Intelligent Tutoring Systems and other AI-driven tools leverage artificial intelligence to personalize learning experiences, enhance student engagement, and improve academic outcomes through AI-powered Learning Management Systems (LMS).

To enhance the delivery and management of educational content, it is necessary to provide personalized learning experiences and efficient administrative support by integrating artificial intelligence by AI-powered Learning Management Systems. These systems utilize data analytics to monitor student progress, recommend resources, and offer adaptive learning paths (Siemens, 2013). Studies have demonstrated that AI-enabled LMS can improve student engagement, retention, and overall academic performance through intelligent content recommendations and data-driven insights.

Technology integration has consistently improved students' achievement and interest, as shown by Eze, Okeke, and Ukeh (2020) with the use of multimedia in teaching chemistry. Similarly, AI integration like using intelligent tutoring systems, adaptive learning platforms, and AI-driven simulations can personalize instruction, making learning more engaging and boosting achievement. Gamification strategies have proven effective in computer studies (Nwankwo & Ukeh, 2023); AI can enhance gamification through real-time feedback, personalized challenges, and rewards tailored to individual learning needs. Cloud computing awareness (Okechukwu & Ukeh, 2022) highlights the need for digital readiness. AI tools heavily rely on cloud infrastructure to deliver scalable and flexible learning experiences, reinforcing the importance of digital literacy for effective AI use. Blended learning methods and tools like Prezi (Ukeh & Nwankwo, 2023; Ukeh, Okeke, Oliver, Eziokwu, Onovo & Orié 2020) show that combining face-to-face and digital tools improves outcomes. AI can further strengthen blended learning by offering predictive analytics, automated grading, and content recommendation systems. AI integration follows the same path as earlier technologies, offering even

greater potential to improve learning, personalize education, and raise academic performance when properly implemented.

The adoption of Artificial Intelligence tools in Nigerian universities is growing but remains at an early stage. Kerr and Heffernan (2017) argued that Intelligent Tutoring Systems (ITS) contribute to enhanced instructional delivery by offering personalized learning experiences that promote student engagement and academic success. Järvelä and Renninger (2019) on their own highlighted that ITS improve the quality of teaching by fostering deeper engagement and enabling more tailored feedback for students. Despite its global impact, AI integration in Nigerian universities remains limited due to infrastructural and skill-based challenges (Okoye & Ukoha, 2021). However, efforts are being made to ensure integration of AI into the instructional delivery in Nigerian universities especially in the public own universities.

Public universities are government-funded higher education institutions that provide accessible and affordable education to the general public. Public universities in Enugu State are gradually exploring the use of Artificial Intelligence (AI) tools, especially smart learning platforms, to enhance teaching and learning (Eze & Nwankwo, 2023). Institutions like the University of Nigeria, Nsukka (UNN) and Enugu State University of Science and Technology (ESUT) have shown noticeable efforts in integrating Information and Communication Technology (ICT) into their academic activities. Despite these efforts, the level of AI integration into everyday instructional delivery remains relatively low and inconsistent across faculties. Many lecturers still rely heavily on traditional teaching methods, limiting the full benefits that AI and ICT tools can offer to students. The integration of artificial intelligence has significantly enhanced instructional delivery in public universities in Enugu State by promoting personalized learning, improving efficiency, and supporting data-driven teaching methods. It is based on this background that the present study determined the impact of artificial intelligence integration on instructional delivery in public universities in Enugu State.

Statement of the Problem

The integration of Artificial Intelligence (AI) into education is reshaping teaching and learning globally. However, the integration of AI in instructional delivery in public universities in Enugu State remains inconsistent. Many lecturers still rely heavily on traditional teaching methods, despite the availability of AI-driven tools. This gap raises concerns about the quality, efficiency, and relevance of instructional delivery in today's digital age. There is a lack of empirical evidence on how AI integration is influencing teaching practices in public universities in Enugu State. It is unclear whether lecturers possess the necessary skills to integrate AI technologies during instructional delivery. Challenges like inadequate infrastructure, poor internet connectivity,

and resistance to technological change may further hinder the successful integration of artificial intelligence. Students' learning outcomes may also be affected by the level of AI integration in instructional delivery. Previous studies in Nigeria have focused largely on general ICT use, leaving AI-specific impacts under-researched. Without addressing these gaps, public universities in Enugu State may continue to lag behind in meeting global educational standards. There is, therefore, an urgent need to investigate the actual impact of AI integration in terms of Intelligent Tutoring Systems and AI-powered Learning Management Systems (LMS) on instructional delivery in public universities in Enugu State, Nigeria..

Purpose of the Study

The general purpose of the study was to determine the impact of artificial intelligence integration on instructional delivery in public universities in Enugu State. Specifically, the study sought to:

1. examine the extent to which Intelligent Tutoring Systems impact instructional delivery in public universities in Enugu State;
2. ascertain the extent to which AI-powered Learning Management Systems (LMS) impact instructional delivery in public universities in Enugu State.

Research Questions

The following research questions guided the study:

1. To what extent do Intelligent Tutoring Systems impact instructional delivery in public universities in Enugu State?
2. To what extent do AI-powered Learning Management Systems (LMS) impact instructional delivery in public universities in Enugu State?

Hypotheses

The following hypotheses were formulated and tested at .05 alpha level of significance:

1. There is no significant difference between the mean ratings of male and female lecturers on the extent to which Intelligent Tutoring Systems impact instructional delivery in public universities in Enugu State.
2. There is no significant difference between the mean ratings of male and female lecturers on the extent to which AI-powered Learning Management Systems (LMS) impact instructional delivery in public universities in Enugu State.

RESEARCH METHOD

The researcher adopted a descriptive survey research design for this study. Nworgu (2018) defined descriptive survey research design as one which a group of people or items is studied by collecting and analyzing data from a few people or items regarded as being representative of the entire group. It was conducted in the three public universities in Enugu State. The population for the study comprised 2943 (1966 male and 977 female) lecturers. The sample size was 294 respondents which comprised 196 male and 98 female lecturers. The researcher used proportionate sampling technique to draw the sample size. The instrument for data collection was a researcher developed questionnaire titled "Extent of Artificial Intelligence Integration on Instructional Delivery in Public Universities Questionnaire (EAIIDPUQ)". The instrument contained 16 items based on the two research questions. Three experts in Faculty of Education, Enugu State University of Science and Technology validated the instrument. The reliability of the instrument was determined using Cronbach Alpha method which yielded 0.81 for cluster 1 and 0.83 for cluster 2 with an overall reliability index of 0.82 which indicated that the instrument was reliable.

However, out of the 294 copies of questionnaire administered, the researcher and her research

assistants retrieved 278 copies (190 from male 88 from female lecturers) which was a 94.56% retrieval rate. Mean scores and standard deviation were used to answer the research questions, while t-test statistic was used to test the hypotheses. In rating the mean, each response option had a numerical value based on real limit of numbers: Very Great Extent (VGE) = 3.50-4.00; Great Extent (GE) = 2.50-3.49; Low Extent (LE) = 1.50-2.49; Very Low Extent (VLE) = 0.00-1.49. The interpretation of the test of hypotheses was based on the significance (sig.) values from the SPSS output. Reject the null hypothesis when: The p-value is less than or equal to your chosen significance level (α , usually 0.05). This means there is enough evidence to support the alternative hypothesis. On the other hand, do not reject the null hypothesis when: The p-value is greater than your significance level (α). This means there is not enough evidence to say the alternative hypothesis is true.

RESULTS

Research Question 1: To what extent do Intelligent Tutoring Systems impact instructional delivery in public universities in Enugu State?

Table 1: Mean scores of male and female lecturers on the extent to which Intelligent Tutoring Systems impact instructional delivery in public universities

ITEMS		Male Lecturers 190		Female Lecturers 88		Overall 278		
S/N	The following features of Intelligent Tutoring Systems impact instructional delivery:	\bar{x}	SD	\bar{x}	SD	\bar{x}	SD	Dec
1	Natural Language Processing.	2.61	.84	2.63	.85	2.62	.84	GE
2	Student Modelling.	2.57	.83	2.58	.84	2.57	.84	GE
3	Real-Time Feedback Systems.	2.89	.85	2.91	.84	2.90	.85	GE
4	Learning Analytics.	2.93	.86	2.95	.85	2.94	.86	GE
5	Interactive Problem-Solving Tools.	2.69	.84	2.70	.85	2.69	.85	GE
6	Instructor Dashboards.	2.78	.86	2.77	.85	2.78	.86	GE
7	Collaboration Features.	2.59	.83	2.60	.84	2.60	.84	GE
8	Scaffolded Learning Approaches.	2.65	.85	2.64	.84	2.65	.85	GE
Cluster Mean/SD		2.71	.85	2.72	.85	2.72	.85	GE

The data in Table 1 show that both male and female lecturers agreed that Intelligent Tutoring Systems (ITS) greatly impact instructional delivery in public universities in Enugu State. All the items listed such as Natural Language Processing, Student Modelling, and Real-Time Feedback Systems had mean scores between 2.57 and 2.94, indicating a "Great Extent" (GE) of impact. The cluster mean of 2.72 further confirms that lecturers perceive a strong overall positive impact of Intelligent Tutoring Systems features on instructional delivery. The standard deviations, mostly around 0.84–0.86, suggest

that there was little variation in the lecturers' responses. Overall, the findings show a consistent and favourable view among lecturers, regardless of gender, on the usefulness of Intelligent Tutoring Systems in improving instruction.

Research Question 2: To what extent do AI-powered Learning Management Systems (LMS) impact instructional delivery in public universities in Enugu State?

Table 2: Mean ratings of male and female lecturers on the extent to which AI-powered Learning Management Systems (LMS) impact instructional delivery in public universities

S/N	ITEMS	Male Lecturers 190		Female Lecturers 88		Overall 278		Dec
		\bar{x}	SD	\bar{x}	SD	\bar{x}	SD	
9	TalentLMS with AI add-ons	2.65	.93	2.60	.95	2.62	.94	GE
10	Coursera for Campus	2.64	.88	2.66	.86	2.59	.87	GE
11	Knewton Alta	2.69	.90	2.63	.89	2.58	.90	GE
12	SAP Litmos	2.68	.84	2.60	.86	2.65	.85	GE
13	Canvas LMS with AI features	2.65	.91	2.62	.90	2.64	.91	GE
14	Blackboard Learn Ultra	2.61	.84	2.59	.85	2.60	.85	GE
15	Google Classroom (with AI integrations)	2.69	.85	2.67	.83	2.68	.84	GE
16	Moodle with AI plugins	2.69	.85	2.67	.88	2.68	.87	GE
Cluster Mean/SD		2.66	.88	2.63	.88	2.63	.88	GE

Male and female lecturers in public universities in Enugu State rated the impact of AI-powered LMS features on instructional delivery as generally "Great Extent (GE)". The cluster mean ratings were 2.66 for male lecturers, 2.63 for female lecturers, and 2.63 overall, showing very little difference in perception across genders. Tools like Google Classroom with AI integrations and Moodle with AI plugins had the highest mean scores (2.68) overall, indicating stronger impact. The standard deviations (around 0.84 to 0.94) suggest that lecturers' responses were moderately consistent

without extreme variations. The findings imply that AI-powered LMS moderately impact instructional delivery, but not at an exceptionally high level.

Hypotheses

1. There is no significant difference between the mean ratings of male and female lecturers on the extent to which Intelligent Tutoring Systems impact instructional delivery in public universities in Enugu State.

Table 3: t-test on the mean scores of male and female lecturers on the extent to which Intelligent Tutoring Systems impact instructional delivery in public universities

Group	N	\bar{x}	SD	df	p-value	Decision
Male Lecturers	190	2.71	.85	278	.089	H ₀₁ not rejected
Female Lecturers	88	2.72	.85			

Table 3 shows that male lecturers (n = 190) had a mean rating of 2.71 with a standard deviation of 0.85, while female lecturers (n = 88) had a mean rating of 2.72 with the same standard deviation of 0.85. The p-value is 0.089, which is greater than the 0.05 significance level, indicating no statistically significant difference between the groups. Based on this result, the null hypothesis (H₀₁) was not rejected, meaning gender did not influence how lecturers rated the impact of Intelligent Tutoring Systems on instructional delivery. Therefore, both male and

female lecturers perceived the impact of Intelligent Tutoring Systems on instructional delivery similarly in public universities in Enugu State.

2. There is no significant difference between the mean ratings of male and female lecturers on the extent to which AI-powered Learning Management Systems (LMS) impact instructional delivery in public universities in Enugu State.

Table 4: t-test on the mean scores of male and female lecturers on the extent to which AI-powered Learning Management Systems (LMS) impact instructional delivery in public universities

Group	N	\bar{x}	SD	df	p-value	Decision
Male Lecturers	190	2.66	.88	278	.056	H ₀ not rejected
Female Lecturers	88	2.63	.88			

The table presents a t-test analysis comparing the mean scores of male and female lecturers on the impact of AI-powered Learning Management Systems (LMS) on instructional delivery. The mean scores for male lecturers (2.66) and female lecturers (2.63) are very close, with standard deviations of .88 for both groups. The p-value of .056 is slightly above the 0.05 significance level, indicating that there is no statistically significant difference between the groups. Therefore, the null hypothesis (H₀) is not rejected, suggesting that gender does not significantly affect lecturers' perceptions of AI-powered LMS impact in Enugu State public universities.

DISCUSSION OF FINDINGS

The study revealed that Intelligent Tutoring Systems (ITS) significantly enhance the quality and effectiveness of instructional delivery in public universities in Enugu State. These systems facilitate personalized learning experiences, improving student engagement and academic performance. Additionally, the use of ITS in classrooms enables lecturers to better address individual student needs, thereby fostering a more efficient learning environment. This is agreement with the assertion of Kerr and Heffernan (2017) who argued that Intelligent Tutoring Systems (ITS) contribute to enhanced instructional delivery by offering personalized learning experiences that promote student engagement and academic success. It is also in line with Järvelä and Renninger (2019) opinion. They highlighted that ITS improve the quality of teaching by fostering deeper engagement and enabling more tailored feedback for students.

The study found that AI-powered Learning Management Systems (LMS) have a profound impact on instructional delivery in public universities in Enugu State. These systems offer adaptive learning features that personalize content delivery based on individual student needs, learning pace, and performance. They also automate administrative tasks such as grading, attendance tracking, and assignment management, freeing lecturers to focus more on instructional quality. As a result, students experience improved engagement, better academic support, and enhanced learning outcomes. This finding aligns with Järvelä and Renninger (2019), who emphasized that AI-powered LMS significantly transform instructional practices in higher education.

CONCLUSION

The outcomes of this study showed that Intelligent Tutoring Systems and AI-powered Learning Management Systems significantly impact instructional delivery in public universities in Enugu State. Intelligent Tutoring Systems and AI-powered Learning Management Systems which are Artificial Intelligence (AI) tools significantly improved teaching efficiency, personalized learning experiences, and promoted better student engagement in public universities. Lecturers and students who are involved in the utilization of these AI tools reported noticeable gains in academic performance. There is need for an urgent need for wider adoption of AI-based educational tools in public universities.

Recommendations

Based on the findings, the researcher recommended that:

1. Public universities in Enugu State should allocate more funds to acquire, upgrade, and maintain Intelligent Tutoring Systems and AI-powered LMS.
2. Universities should organize regular workshops and hands-on training for lecturers to master the use of AI tools in instructional delivery.
3. Faculties should revise their curriculum to incorporate the use of AI systems as part of the learning activities and assessment strategies.

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