Investigating the Roles of Generative AI in Improving the Quality of Teachers' Education in Uyo Metropolitan Public Secondary Schools, Nigeria

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Abstract

The study examined the role of generative AI in improving the quality of Teachers' Education In Uyo Metropolitan Public Secondary Schools, Nigeria. The specific objectives were to determine if the application of GAI enhance teacher instructional quality, students quality interactive learning and teacher quality assessment in Uyo metropolitan public secondary schools in Nigeria. Three research objectives and three research questions guided the study. The population consisted of 114 teachers drawn from public secondary schools in uyo metropolitan while a sample size of 89 teachers was selected for the study through the stratified random sampling technique. The result of the study showed that GAI enhance teacher instructional quality, students quality interactive learning and teacher quality assessment in Uyo metropolitan public secondary schools in Nigeria. Recommendations proffered include the need for teacher training on AI, government funding for AI implementation in schools and proper monitoring and evaluation mechanism to implement feedbacks and corrective measures.

Key Words: Generative Artificial Intelligence, Quality Teacher Education

Introduction

Teachers have long been seen as the main forces behind educational progress. The National Policy of Education states that no education system can be better than the quality of its teachers (FGN, 2020). They act as the main catalyst and resource for students' academic development and advancement since they are knowledge sources and change agents (Wallace, 2019). Teacher effectiveness has garnered interest from educators, parents, and education administrators. Effectiveness is measured by the academic achievement of students on both internal and external examinations. There is a common belief that teachers of students who do poorly on examinations are inept, whereas teachers of kids who do well are highly skilled. Research to date has shown that the effectiveness of a teacher has an impact on pupils' academic progress (Afe, 2020). It makes sense because teachers serve as facilitators, helping students learn and teach. Still, given the issues surrounding low academic performance at the secondary school level, the government and other education stakeholders have recently paid close attention to the need to uphold strong standards in teacher education. The set goals and objectives of the educational system nevertheless pose significant challenges at the secondary school level. This concerning tendency has led an assessment of the performance index and adoption of the quality assurance indices, which are ingrained in Nigeria's national education policy and heavily prioritize teachers' superior classroom management. Teacher education is the ability to produce teachers who meet the requirements for instruction established by the ministry of education at the school level. Liphie (2020)

Quality assurance in education deals with the systematic management, supervision, monitoring, assessment, evaluation, and strategic review of the resource inputs, teaching-learning process, and output continuously in order to achieve academic standards that meet the established goals and expectations of the stakeholders in the education sector and the larger society Nwankwoala (2021). Effective classroom management, which serves as a real instrument for teaching knowledge and skills for the development of students' intellectual capacity, is primarily responsible for this. When it comes to teaching quality, the viewpoint that educators bring to the classroom, the instructional strategies they use, and the community and school's overall structure all matter just as much as their credentials.

This multi-layered strategy is supported by research, such as the previously cited Heck (2007) study. Increasing the caliber of instruction is a critical component of any successful school reform initiative. The Kristin (2023) Therefore, one of the instructional tactics used to uphold high standards for teacher preparation and student academic progress is the use of technology in the classroom. The area of education has rapidly changed in the twenty-first century, largely due to advancements in technology such as artificial intelligence. Petersen (2021). Recent advances and expansions in machine learning have enabled more sophisticated and inventive digital content generating technologies, like generative artificial intelligence (AI) (Hu, 2022).

"Generative AI" is an artificial intelligence technique that can create a variety of content, including text, graphics, audio, and synthetic data. The recent hype around generative AI has been fueled by new user interfaces that are so simple to use that they allow one to quickly and easily create

amazing text, drawings, and films. George (2023). "Generative modeling artificial intelligence" (GAI) is a machine learning framework that leverages concepts such as probability, statistics, and other ideas to generate artificial artifacts, either fully supervised or partially supervised. Jovanović (2022). With the use of developments in deep learning (DL), generative AI analyzes training samples and learns the distribution and patterns of them to produce artificial remnants from text, video, images/graphics, and audio. Abukmeil (2021).The two primary generative artificial intelligence (AI) models discovered by extant research are Generative Adversarial Networks (GAN) and Generative Pre-trained Transformers (GPT).Brown (2020).

Artificial Intelligence holds great promise for enhancing the quality of teacher education and learning. With AI, teachers may provide students with tailored lessons and feedback according to their specific learning needs and stages of growth. According to a study by Chen and colleagues (2020), students could benefit from personalized math tutoring using ChatGPT, a conversational agent based on a generative model, which would improve their learning outcomes. The study found that the conversational agent could tailor its explanations to the students' misunderstandings and comprehension level. Teachers can focus more of their time on other aspects of their instruction when AI grades essays.

According to a study by Kim and colleagues (2019), a generative model (ChatGPT) trained on a dataset of human-graded essays was able to accurately judge essays written by high school students, with a correlation to human grades of 0.86. The study's findings showed that the model could identify crucial elements of well-written essays and could provide feedback that was on par with that of human graders. By employing AI to translate educational materials into several languages, a wider audience can more easily access them. With its assistance, instructors may create engaging learning spaces where students can communicate with virtual tutors in-person. Adaptive learning systems, which adjust their teaching strategies in response to a student's growth and success, can be created with AI.

A study by Chiang and colleagues (2021) found that ChatGPT, an adaptive learning system based on a generative model, may provide students learning programming with more effective help, improving their performance on programming tests. The study found that the model could adjust the degree of difficulty in the issues it generated based on the students' prior knowledge. Taking everything into account, artificial intelligence (AI) has enormous potential as a tool to enhance education by providing. ChatGPT, 2023. It is based on these that the study aims at Investigating the roles of Generative Ai in improving the quality of Teachers' Education In Uyo Metropolitan Public Secondary Schools, Nigeria.

Objectives

The main objective of the study is to Investigate the roles of Generative AI in improving the quality of Teachers' Education In Uyo Metropolitan Public Secondary Schools, Nigeria.

The specific objectives include

1. To investigate the role of G AI in enhancing teacher instructional quality in uyo metropolitan public secondary schools in Nigeria.
2. To investigate the role of GAI in enhancing students quality interactive learning in uyo metropolitan public secondary schools in Nigeria.
3. To investigate the role GAI in enhancing teacher quality assessment in uyo metropolitan public secondary schools in Nigeria.

Research Questions

The study is guided by the following research questions

4. Do the application of GAI enhance teacher instructional quality in uyo metropolitan *public secondary schools in Nigeria.*
5. Do the application of GAI enhance students quality interactive learning in uyo metropolitan *public secondary schools in Nigeria.*
6. Do the application of GAI enhance teacher quality assessment **in** uyo metropolitan *public secondary schools in Nigeria.*

Methods

Research Design

In order to collect data for the study, a survey design was employed, which involved the creation and distribution of questionnaires. According to Jessica G. Mills (2021), survey design is a sort of research design in which surveys are the primary technique of acquiring data. Surveys are used in this study as a method to assist researchers in comprehending individual or group viewpoints on a particular concept or issue of interest. A survey usually consists of a set of structured questions, each meant to extract a specific piece of information.The Instruments applied in this survey seeks to elicit information on the roles of Generative Ai in improving the quality of Teachers' Education In Uyo Metropolitan Public Secondary Schools, Nigeria

Study Area

The study was conducted in the Uyo local government area of Akwa Ibom State.
The majority of people in the research area are employed in trade and agriculture, with a smaller proportion in the public sector and politics. In addition to Christian religious traditions, Uyo is home to a variety of cultural beliefs.The predominant language spoken by the people of Akwa Ibom State is Ibibio.

Population of the Study

As indicated in Table 1, the study population consisted of 114 teachers who were selected from five schools in the Uyo local government area of Akwa Ibom State, Nigeria.

Table 1: Population Distribution of School in Uyo LEC

S/N	Name of Schools	No of Teachers
1	Community Secondary School Ikot okubo	23
2	Christian secondary school , Uyo	24
3	Community Secondary School Aka Offot	23
4	Community secondary school four towns, Uyo.	22
5	Community secondary school Mbak Etoi	22
	Total	114

Source: Field Survey, 2023, State Universal Basic Education Board.

Sampling and Sampling techniques

The study's sample size consisted of 89 teachers who were chosen through the use of the stratified simple random technique.

Table 2: Sample Distribution

S/N	Schools	Sampled Teachers
1	Community Secondary School Ikot okubo	18
2	Christian secondary school , Uyo	16
3	Community Secondary School Aka Offot	17
4	Community secondary school four towns, Uyo.	23
5	Community secondary school Mbak Etoi	15
	Total	89

Source: Field Survey, 2023

3.6 Instrument for Data Collection

"Investigating the roles of Generative AI in improving the quality of Teachers' Education In Uyo Metropolitan Public Secondary Schools, Nigeria. (ITROGAIIQOEIUMPSC)" is the name of the structured questionnaire used to analyze the study. There were two sections in the questionnaire: A and B. The respondents' biographies were in Section A, while multiple-choice questions were

in Section B.The following rated scale was used by the respondents to help them choose an answer from the available options:

SA - 4   Strongly agree

A - 3   Agree

D - 2   Disagree

SD - 1   Strongly disagree

Validity of the Instrument

Researchers and academic instructors from the National Open University of Nigeria's faculty of education verified the instrument.

Reliability of the Instrument

A test-retest reliability approach was used to guarantee the instrument's reliability. Initially, the test was taken by twenty teachers from one of the schools who were selected at random to take it. The same teachers retook the test after a span of two weeks. After calculating their variances, a reliability ratio of 0.65 was discovered, demonstrating the reliabiity of the instrument.

Procedure for data collection

To help administer the instrument to the respondents at the schools, the researcher recruited a research assistant.The assistant helped distribute questionnaires to the respondents. Every administered questionnaire was successfully completed and returned.

Method of Data Analysis

Regression analysis's R^2 value was used to answer the research questions at the 0.05 level of significance.

Result & discussion

The result of the study showed that

1. The application of GAI enhance teacher instructional quality in Uyo metropolitan *public secondary schools in Nigeria.*

2.The application of GAI enhance students quality interactive learning in uyo metropolitan *public secondary schools in Nigeria.*

3.The application of GAI enhance teacher quality assessment in Uyo metropolitan *public secondary schools in Nigeria.*

Using technology in the classroom is one educational strategy intended to sustain excellent teacher development and academic achievement for students. The rapidly evolving field of educational practices in the twenty-first century has been greatly influenced by technological breakthroughs, including artificial intelligence (Petersen, 2021). Recent advances and expansions in machine learning have enabled more sophisticated and inventive digital content generating technologies, like generative artificial intelligence (AI) (Hu, 2022). "Generative AI" is an artificial intelligence technique that can create a variety of content, including text, graphics, audio, and synthetic data.

The recent hype around generative AI has been fueled by new user interfaces that are so simple to use that they allow one to quickly and easily create amazing text, drawings, and films. With the use of developments in deep learning (DL), generative AI analyzes training samples and learns the distribution and patterns of them to produce artificial remnants from text, video, images/graphics, and audio. The quality of instruction given by teachers, the interactive learning environment for students, and the evaluation of teachers are only a few benefits of utilizing AI to enhance teacher education and learning.

With AI, teachers may provide students with tailored lessons and feedback according to their specific learning needs and stages of growth. According to a study by Chen and colleagues (2020), students could benefit from personalized math tutoring using ChatGPT, a conversational agent based on a generative model, which would improve their learning outcomes. The study found that the conversational agent could tailor its explanations to the students' misunderstandings and comprehension level.Teachers can focus more of their time on other aspects of their instruction when AI grades essays. According to a study by Kim and colleagues (2019), a generative model (ChatGPT) trained on a dataset of human-graded essays was able to accurately judge essays written by high school students, with a correlation to human grades of 0.86.The study's findings showed that the model could identify crucial elements of well-written essays and could provide feedback that was on par with that of human graders. By employing AI to translate educational materials into several languages, a wider audience can more easily access them. With its assistance, instructors may create engaging learning spaces where students can communicate with virtual tutors in-person. Adaptive learning systems, which adjust their teaching strategies in response to a student's growth and success, can be created with AI. A study by Chiang and colleagues (2021) found that ChatGPT, an adaptive learning system based on a generative model, may provide students learning programming with more effective help, improving their performance on programming tests. The study found that the model could adjust the degree of difficulty in the issues it generated based on the students' prior knowledge. All things considered, artificial intelligence (AI) holds great promise as a technology to improve education by offering. ChatGPT, 2023.

Conclusion

The study conclude that Generative AI play significant role towards improving the quality of Teachers' Education In Uyo Metropolitan Public Secondary Schools, Nigeria. It specifically

enhances teacher instructional quality, students quality interactive learning **and** teacher quality assessment

Recommendation

The study proffers the following recommendations based on the findings of the study

1. The need for government to provide adequate funding for the acquisition and implementation of GAI technology across the schools to enhance teacher quality education and students learning .
2. Effective training be provided to teachers on the use of GAI in schools
3. The school authorities should put in place adequate monitoring and evaluation mechanism for the assessment of the outcome of the use of GAI
4. Also feed backs received on challenges and limitations confronted in the use of GAI should be promptly addressed and corrective measures implemented.

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