

Artificial Intelligence Tools as Complementary Instructional Strategy in Enhancing Educational Assessment Knowledge of Students in Federal College of Education, Pankshin

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ABSTRACT

The study examined the effectiveness of artificial intelligence as a complementary instructional strategy in enhancing Educational Assessment knowledge of students in Federal College of Education, Pankshin. The GenAI tools were used to complement other classroom based instructional to facilitate teaching and learning of Educational Assessment course contents. Four research questions and two hypotheses served as a guide in the study. Quasi-experimental design was employed and the use of qualitative and quantitative approaches to examined students' knowledge and understanding of educational assessment practices. The population comprised 1,500 NCE II students in 2024/2025 academic session while the samples size consisted 104 students selected using stratified random sampling technique. The instruments for data collection were questionnaire title "Students Utilization of Artificial Intelligence in Learning" (SUAIL) and Educational Assessment Knowledge Test (EAKT). The SUAIL and EAKT were subjected to validity using face validity while split-half and Cronbach alpha method were used to compute reliability coefficient. The data were analyzed using coding of qualitative to obtain frequencies of the students' response. Also, mean and standard deviation provide answers to some research questions while ANCOVA was used to test the hypotheses formulated. The study established among other that AI tools improved students' knowledge in educational assessment without gender bias. The study therefore, recommended that in addition to the existing strategy, educational assessment teachers should incorporate GenAI tools to complement their teaching strategies in the classroom.

Keywords: Artificial Intelligence, Instructional Strategy, Educational Assessment and Teacher Education

INTRODUCTION

The emergent of artificial intelligence (AI) tool is speedily steering a transformative era in educational system. Artificial intelligence can be seen as process of making machine to do what normally require human intelligent. In other word it is a machine assistant helping to provide solution or assist in understanding of concepts. In teaching and learning, AI tool is offering unprecedented opportunities to enhance teaching and learning processes across all levels of education. The tools have the capability to foster learning experiences and improve students' understanding of concepts taught in schools, as well as whatever they wish to learn independently. Integrating AI tools make educating process more efficient and enjoyable, because the platform helps to enhance learning experiences personally and collectively.

AI tool is potentially revolutionizing teaching and learning, particularly for teacher education students, making education process more efficient and inclusive. The tool adapts to the unique needs of each learner, ensuring that students receive educational support and resources required to thrive in their academics (Holmes et al., 2021). It offers new ways to learn concepts and idea with high preference support for all kind of learners, it also help to assess students' progress, provide real-time feedback, and identify areas where students may need additional support (Luckin et al., 2016). The integration of AI as part of learning strategy in teacher education will go beyond the usual traditional instructional process but, offering innovative approaches to build skills, promoting deep learning and encourages strong understanding of learning contents. It will also help to bridge the gap

between theoretical knowledge and practical application that will enhance overall learning experience of teacher education students.

Teacher education is the process of training people to become effective and develop a skillful and competent in teaching profession for future need (Lal & Jamal, 2021). The system policies were designed to train individual interested to become teachers to develop skills and principle of teaching. The system is designed to provide trainee teachers content-mastery, pedagogical skills and teaching practice which encompasses the entire teaching profession. However, there are concerns regarding some aspect of pedagogical practices of teachers due to insufficient knowledge. Some of the areas are educational assessment and evaluation practices. Educational assessment is a process of evaluating to indicates extent at which a set of educational objectives are attained both to the teachers and learners in a school system. It involves assessing students learning, skills with definite outcomes through tools such as test, projects, observations available within the key framework of formative, summative and authentic assessment process. Given this critical role of assessment in education, it is essential for teacher education students to not only understand but also apply principles effectively.

A good assessment practices place teachers and learners at high advantage in teaching-learning processes. Therefore, complementing AI with other instructional strategies can significantly enhance teacher education students' knowledge in the course contents and improve their ability towards implementing good assessment in a real-life setting. AI tools have shown to enhance academic performance and comprehension in various educational contexts (Holmes et al., 2021; Luckin et al., 2016). The tools adapt to individual student needs, making learning more interactive and targeted, particularly valuable for complex courses like Educational Assessment (Zawacki-Richter et al., 2019). Hence, artificial intelligence as complementary instructional strategies will foster deeper engagement and understanding of the course contents in focus.

This study explored the potentiality in generative artificial intelligence (GenAI) tools to complement other instructional strategies during teaching-learning of educational assessment course among teacher education students in Federal College of Education, Pankshin, Plateau State, Nigeria. Generative Artificial Intelligence (GenAI) is one of innovative branches of AI that employs Machine Learning (ML) and Deep Learning (DL) algorithms to generate contents considered exclusive domain of human creativity, such as text, audio, video, images or computer code (Chen et al., 2020). The generative AI provided additional supports to students during teaching and learning and enhance learning facilitation between teacher and students. The tool further enhanced explanation of basic assessment concepts with practical examples of how examination questions are grafted based on each content taught. Kasneci et al. (2023) posited, this technology streamlines the creation of personalized educational content, augments instructional strategies and fosters interactive engagement with learning materials, thereby conferring tangible benefits to the instructional domain. This helps in understanding of how assessment questions are categorized in relation to educational objectives across level with specific example on bloom's taxonomy. The GenAI deployed were readily available for student's usage without limitation for learning at all time with explanation of various concepts are given in it is simplest form. The tool also provided the description of the content in small bite form that can be tagged as microlearning procedures that reduces cognitive overload.

The teacher education students are being trained as prospective teacher on the tenet of teaching profession with responsibility of good assessment practices. The utilization of AI to complement instructional tools was to enhance their knowledge in educational assessment principles and broadening their understanding of the course contents as specified in NCE Minimum Standard. This strategy helped to develop a stronger foundation in knowledge and practice of educational assessment, since a good knowledge of assessment process enhances educational quality. Thus, this study utilized Generative artificial intelligence tools available to complement existing instructional strategies in the teaching and learning of Educational Assessment course contents within the context of Nigeria Certificate in Education (NCE) students at Federal College of Education, Pankshin.

Problem Statement

Educational assessment is a crucial training required for teacher education students, purposely for effective measuring and evaluating learner's knowledge and understanding. However, many teacher education students are always struggling to grasp the principles associated with assessment as part of classroom practices of a

teacher. These called for specific approach to complements the existing instructional strategy to improve student knowledge and eventually their outcomes in the course. Lal and Jamal (2021) stated that teacher education programs need innovative approaches to address the gaps in student learning. Hence, AI as complementary instructional tools seems to present a promising solution to these knowledge gaps by offering deeper understanding and tailored interventions that can help students develop a more profound learning of the course concepts. Given these challenges teacher education students face in mastering educational assessment concepts, there is a need to enhance their learning capability through a complementary strategy. Hence, this study explored how AI can complement to improve students' knowledge and performance in educational assessment course in teacher education programme.

Research Questions

The following research questions serve as a guide

1. To what extent do teacher education students are familiar with the utilization of generative artificial intelligence tools in learning processes?
2. What is the mean difference in the performance of teacher education students who utilizes generative artificial intelligence tools as a complementary instructional strategy in teaching and learning of Educational Assessment practices?
3. To what extent is the effectiveness of generative artificial intelligence tools as complementary instructional strategy for teaching of Educational Assessment knowledge differ based on gender of teacher education students?
4. How effective is the use of generative artificial intelligence as complementary instructional strategies in teaching and learning processes of Educational Assessment based on students' perception?

Research Hypotheses

1. There is no significant difference between the knowledge gained by teacher education students that utilizes generative artificial intelligence in Educational Assessment and the control group.
2. There is no significant difference in the knowledge gained by the students who utilizes generative artificial intelligence as a complementary instructional strategy in Educational Assessment knowledge based on gender.

LITERATURE REVIEW

Traditional teaching approaches such as lecture-based method has often fall short in meeting the diverse learning needs of students, particularly teacher education students because the students need to acquire practical skills to assess and support learners effectively. The integration of artificial intelligence (AI) in education is reshaping instructional practices, especially in complex and skill-intensive areas like Educational Assessment. AI has the potential to transform these learning experiences by providing deep knowledge, personalize instruction, offering of real-time feedback and enhancing learning engagement. Holmes et al. (2021), highlighted the potential of AI tools to create adaptive learning environments that cater for individual student needs, thus fostering a deeper understanding of complex subjects such as educational assessment. In this study, generative AI was used to complement teaching and learning in order to explain complex concepts in educational assessment in many ways for proper understanding. This further reduces cognitive overload for students even when lecturer isn't available to explain deeply.

In teacher education programme, proficiency in Educational Assessment is critical because effective assessment practices are essential in measuring students' progress, supporting their development. Therefore, the practices must be well inculcated during teacher training processes. According to Lal and Jamal (2021), traditional instructional methods often do not adequately prepare students to apply theoretical assessment principles in

practical scenarios, leading to gaps in their understanding and application of essential skills. AI as an instructional tool, like intelligent tutoring systems and adaptive platforms, address these challenges by offering targeted support and guiding students in mastering complex skills. AI tools bridge the gap between theory and practice, preparing future educators for real classroom challenges (Chassignol et al., 2018).

Integrating AI into education, especially the teacher education programme, poses certain challenges due to limited technological infrastructure, insufficient training, concerns around data privacy hinder the effective usage of AI in educational institutions particularly, in countries like Nigeria. Teacher education students may also face difficulties due to varying levels of digital literacy, which can impact their effectiveness of AI-based tools. Despite these challenges, studies consistently show that AI-driven learning interventions can enhance students' understanding, performance, and engagement with course material, making it a valuable complementary strategy for NCE programs focused on Educational Assessment (Luckin et al., 2016).

Theoretical Framework:

This study is hinged on Constructivist Learning Theory, which posits that learners construct knowledge actively through experiences and interactions, rather than passively absorbing information. According to Vygotsky (1978), knowledge is built as learners engage with their environment, interpret information, and connect new ideas with prior knowledge. In the context of AI-powered instructional strategies, constructivism supports the idea that learning is most effective when it is personalized, interactive, and tailored to individual needs. This theoretical framework emphasizes the role of AI as a complementary instructional tool that fosters active, meaningful learning in Educational Assessment. By offering tailored support and enabling self-paced learning, AI enhances teacher education students' ability to construct their understanding of complex concepts, bridging the gap between theory and practice. AI tools, through adaptive learning and real-time feedback, align with constructivist principles by providing teacher education students with hands-on, engaging experiences that deepen their understanding of Educational Assessment.

RESEARCH METHODOLOGY

The study employed quasi experimental design with pre-test posttest control design and mixed-method approach combining qualitative and quantitative data to gain more insight in the study. The design was appropriate to determine the effectiveness of AI tools as complementary instructional strategies in enhancing knowledge on educational assessment among teacher education students. Specifically, generative AI (GenAI) tools were used to complement teaching and learning while teacher anchored the process with utmost care. GenAI tools were deployed to provide assistant to students during classes with relevant actions needed to understand educational assessment concepts and generation of quality assessment items practically. The population comprised 1,500 NCE II students who are currently offering the course in FCE Pankshin. The samples size consisted 104 NCE II students selected using purposive and stratified random sampling techniques. The sample students were further divided into experimental and control groups based on their departments. The instruments for data collection were questionnaire title "Students Utilization of Artificial Intelligence in Learning" (SUAIL) and Educational Assessment Knowledge Test (EAKT). The instruments were self-constructed using GenAI tools by the researchers. The instruments were subjected to validity using face validity while split-half and Cronbach alpha were used as reliability methods. These were done to determine the appropriateness, comprehensiveness, representativeness and consistency of instrument items for the study. Experts' rating was to determine the appropriateness, comprehensiveness and representativeness of instrument items in relation to the objectives of the study. This yielded a validity index of 0.72 for SUAIL and 0.76 for EAKT respectively. Split-half and Cronbach alpha methods were used to determine the research instruments consistency in which a reliability index of 0.75 for SUAIL and 0.71 for EAKT were obtained. The data collected were statistically analyzed using coding and categorization for qualitative data while mean, standard deviation and ANCOVA were used to analyzed quantitative data in the study.

RESULTS

Research question 1: To what extent do teacher education students are familiar with utilization of generative artificial intelligence tools in learning of educational assessment course contents?

Table1: Students' Response on familiar with utilization of artificial intelligence tools in learning

s/n	Item statement	1	2	3	4	5	Mean	Decision
1	To what extent do you make use of artificial intelligence tools during learning processes	5	25	17	10	3	2.68	Accepted
2	Artificial intelligence utilization enhances your understanding concepts effectively.	7	10	26	10	7	3.00	Accepted
3	Artificial intelligence tools usage supports your learning experiences	2	6	22	20	10	3.50	Accepted
4	You often prefer AI tools in guiding your learning processes effectively	12	14	16	12	8	2.93	Accepted
5	You often consult AI tools whenever there are any difficult concepts in your courses.	8	12	20	14	6	2.97	Accepted
	Overall mean						3.02	

The table1 above presents mean response of how teacher education students are familiar with utilization of generative artificial intelligence tools in learning of educational assessment course in the study. Five items were presented to the respondents in the study all the items were accepted with overall mean response of 3.02 indicating a high extent at which teacher education students are familiar with the utilization of artificial intelligence tools in learning of educational assessment course. The result revealed that teacher education students utilizes artificial intelligence tools to an extent but not optimally.

Research question 2: What are the mean achievement scores of students exposed to generative artificial intelligence as complementary instructional strategies and those who are not in Educational Assessment course contents?

Table2: Mean Achievement Scores of Students in Educational Assessment

	GROUP	N	Mean	Std. Dev.	Mean Diff
Pre-Test	Control	56	19.13	5.708	0.33
	Experimental	48	19.46	7.548	
Post-Test	Control	56	22.32	6.402	5.74
	Experimental	48	28.06	5.952	

The table2 above present mean achievement scores and standard deviation of students exposed to artificial intelligence as complementary instructional strategies and those who are not in educational assessment course contents. The results revealed that experimental group outperformed the control group in the study with a mean difference of 5.74. This further substantiate the effectiveness of AI tools in fostering students' knowledge in educational assessment.

Research question 3: To what extent is the effectiveness of generative artificial intelligence as a complementary instructional strategy for teaching of Educational Assessment knowledge differ based on gender of teacher education students?

Table3: Mean Scores of Male and Female Students' in Educational Assessment

	Gender	N	Mean	Std. Deviation	Mean Diff
Pre-Test	Male	21	20.78	6.766	2.48
	Female	27	18.30	6.336	
Post-Test	Male	21	27.90	5.305	0.39
	Female	27	27.51	6.725	

The table 3 above presents the mean achievement scores and standard deviation between male and female students exposed to generative artificial intelligence as complementary instructional strategies in educational assessment course contents. The pre-test mean scores were 20.78 and 18.30 for male and female students respectively while their post-test mean achievement scores were 27.90 and 27.51 for male and female student respectively. The result indicates that both male and female student relatively close when exposed to educational assessment course using artificial intelligence as complementary instructional strategy.

Research question 4: How effective is the use of generative artificial intelligence as complementary instructional strategies in teaching and learning processes of Educational Assessment based on students' perception?

Table4: Qualitative Analysis on Effectiveness of GenAI tools as complementary instructional strategies

	Items statement		
1	How impactful is AI tools on your learning experiences in educational assessment concepts	Frequency	%
	Very impactful	35	58.3
	Moderately impactful	20	33.3
	Low impactful	5	8.3
2	AI Platforms improve your knowledge in application of educational assessment techniques practically	Frequency	%
	It improves my practical knowledge	24	40.0
	It helps in practical application in assessment	36	60.0
3	AI tools influenced your approach in designing educational assessment/interpretation of results	Frequency	%
	It influences my approach very well	43	71.7
	Sometimes assist in designing good assessment items	17	28.3
4	Has AI platforms enhanced or hindered your engagement with your course contents	Frequency	%
	It enhanced my engagement in the course	22	36.7

	It makes more engaged in learning process	38	63.3
5	How effective do you see AI tools as learning platforms in all your courses	Frequency	%
	Highly effective to use for learning	40	66.7
	Moderately effective to use for learning	15	25.0
	Sometime it aids distraction in the classroom	5	8.3
6	How often do you make use of AI tools to clarify difficult concepts when reading your book or in the classroom	Frequency	%
	I use it very often in my study	16	26.7
	Sometimes I use it for understanding of concepts	24	40.0
	I hardly use it sometime not facilities for me	20	33.3
7	What challenges do you face when using AI-driven learning platforms	Frequency	%
	Lack of facilities for it is usage	19	31.7
	Poor power supply for my gadgets	25	41.7
	Inadequate resources to effectively interact with it	16	26.7
8	How can AI be used to enhance future delivery of educational assessment course content.	Frequency	%
	Provision of adequate facilities its usage	31	51.7
	Proper training on AI learning approaches	21	35.0
	More awareness on future development of AI	8	13.3

Testing of Hypotheses

Hypothesis 1: There is no significant difference in the mean achievement scores of students exposed to generative artificial intelligence as complementary instructional strategies and those who are not in Educational Assessment course contents.

Table5: ANCOVA Test Result on Significant Difference between Pre-test and Post-test Achievement

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	142.858 ^a	2	71.429	1.903	.154
Intercept	3195.109	1	3195.109	85.139	.000
PRETEST	128.664	1	128.664	3.428	.067
GROUP	12.103	1	12.103	.322	.571

Error	3790.363	101	37.528		
Total	83521.000	104			
Corrected Total	3933.221	103			

The table5 above presents significant difference between pre-test and post-test achievement of students exposed to artificial intelligence as complementary instructional strategies and those who are not in educational assessment course contents. The hypothesis was accepted since the p-value of 0.571 was greater than 0.05 significance level. Therefore, it was concluded that there is no significant effect of the methods on students' achievement in educational assessment course. However, the student revealed that a significant difference exists between the pre-test and post-test mean achievement scores in educational assessment course when students were taught with generative artificial intelligence as complementary instructional strategy in the study.

Hypothesis 2: There no significant difference in the mean achievement scores of male and female students exposed to generative artificial intelligence as complementary instructional strategies in Educational Assessment course contents.

Table6: ANCOVA Test Result on Significant Difference Between Male and Female Students

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	130.777 ^a	2	65.389	1.737	.181
Intercept	2476.347	1	2476.347	65.776	.000
GENDER	.022	1	.022	.001	.981
PRETEST	126.912	1	126.912	3.371	.069
Error	3802.444	101	37.648		
Total	83521.000	104			
Corrected Total	3933.221	103			

The table6 above presents significant difference results between male and female students' achievement exposed to Artificial Intelligence as complementary instructional strategies in Educational Assessment course contents. The hypothesis was accepted since the p-value of 0.981 was greater than 0.05 significance level in the study. Therefore, there is no significant difference between male and female students' achievement when exposed to artificial intelligence as complementary instruction strategy in educational assessment course. This implies that both male and female achieved relatively close when taught educational assessment with artificial intelligence as complementary instructional strategy.

DISCUSSION OF FINDINGS

The study presents the use of generative artificial intelligence as complementary instructional strategies in teaching-learning of educational assessment course. Firstly, the study revealed that artificial intelligence tools are used by teacher education students above moderate extent in learning. This further indicated that teacher education students are familiar/utilizing artificial intelligence tools in learning process. Secondly, the utilization of generative artificial intelligence to complement instructional process in educational assessment course was found to be effective in the study as its improved teacher education students knowledge based on their achievement in the course. The findings agreed with Chassignol et al (2018) which reported that AI tools bridge the gap between theory and practice and preparing future educators for real classroom challenges. This also

agreed with Holmes et al. (2021) and (Zawacki-Richter et al., 2019) who highlighted that AI tools to create adaptive learning environments and cater for individual student needs to fostering deeper understanding of complex subjects.

The hypotheses tested established no significantly effects of the method on students' achievement in educational assessment course but there exists a significant difference between pre-test and post-test mean achievement scores of teacher education students in the study. This supports improvement in knowledge of students in educational assessment course when generative artificial intelligence complements other instructional strategies. The finding agreed with Luckin et al., (2016) who reported that AI-driven learning interventions enhances students' understanding, performance, and engagement with course material, making it a valuable complementary strategy for teacher education programs and educational assessment course contents. The study also found that no significant difference exists between male and female students in the study. Furthermore, qualitative analysis established that utilization of AI tools in teaching-learning process is impactful, improve students' knowledge, enhanced engagement and understanding of course content effectively. Teacher education utilizes AI tools to understand difficult concepts of the course for clarity and proper learning of the concepts.

CONCLUSION

In conclusion, generative artificial intelligence as complementary instructional strategy improved student knowledge and understanding of educational assessment course in the study. Teacher education students are familiar with and utilized artificial intelligence in their study as the tools was found to be impactful, and very effective to enhance teaching and learning of difficult concepts as demonstrated in educational assessment course contents in the study.

RECOMMENDATIONS

1. Educational assessment teachers in addition to existing strategy should integrate AI tools to complement their teaching strategies to improve teacher education students understanding of concepts in order to improve their knowledge.
2. Teacher education students should be very familiar with and utilize AI tools to improve their efficiency in educational assessment practice.
3. Training should be organized for teacher education students on the use of artificial intelligence in teaching-learning process by the school authority.

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