PLASU Journal of Educational Research (PLASUJER) Vol. 1, No. 2, 2025
A Publication of the Faculty of Education, Plateau State University, Bokkos – Nigeria
ISSN: 3121-9624 https://journals.plasu.edu.ng

INFLUENCE OF ARTIFICIAL INTELLIGENCE DRIVEN ASSESSMENT TOOLS IN MATHEMATICS PERFORMANCE AMONG JUNIOR SECONDARY SCHOOL STUDENTS IN MINNA METRPOLIS NIGER STATE, NIGERIA.

Komolafe Olorunleke – Father O'Connell Science College Minna, Niger State – olorunleke1000@gmail.com.
Obasi Ndidi Olugu - St Bartholomew's Anglican High School, Rantya Gyel-Jos, Nigeria - ndidiolugu510@gmail.com.

Abstract

This study aimed to assess influence of artificial intelligence driven assessment tools in mathematics performance among junior secondary school students in Minna metropolis Niger state, Nigeria. Three research objective were raised three research questions were raised and one research hypotheses were formulated and tested at 0.05 level of significance. Cross-sectional survey research design was used. The population of the study was consisted of students in junior secondary school(JSS2) in Minna metropolis. A simple random sampling techniques was used to select 256 students. Social Learning Theory was applied, A structured questionnaire with four point modified likert scale was used as instrument for data collection. The researcher designed questionnaire titled AI-driven Assessment Questionnaire *(AIAQ) and Mathematics Assessment Record (MAR). The instrument was validated by 2 experts in Research, Measurement and Evaluation Department of Educational Foundation in Faculty of Education, University of Jos. The reliability of the instrument was 0.786 established through Cronbach Alpha method. The descriptive statistics of simple percentage was used to answer all the research questions. Independent sample t-test was used to test the hypotheses at 0.05 level of significance. The result of the study showed a high level of positive perception toward AI-driven assessment tools in mathematics. The finding reviewed that majority of respondents are highly motivated and engaged toward AI-driven assessment tools in mathematics. The finding also reviewed that, there was a significant difference in mathematics performance of students based on gender ($p<.05$), were female perform better than their male counterpart. The study recommended among others: the need for Schools and educational authorities in Niger State should consider adopting AI-driven assessment tools as a complement to traditional methods to improve mathematics outcomes and to content and sustain the observed gains in students' perception, motivation, and engagement. AI tools should be designed with gender-sensitive algorithms and content to sustain the observed gains among female students.*

Key words: Artificial intelligence, Artificial intelligence driven tools and Assessment tools.

Introduction

Artificial Intelligence is the field of study that try to describe and compete with intelligentof human behaviour in terms of computational processes. Artificial Intelligence is the study of the ideologies and methods for producing machines that can perform tasks that would normally require human effort and intelligence. Artificial Intelligence is an advance computer programing that capable of performing human activities fast, accurate and effective. Nick Bostrom (2014) Artificial Intelligence is the field of study that focuses on creating systems capable of performing tasks that would normally require human intelligence. Artificial Intelligence is the science of making machines to do or create things that would require human effort and intelligence. Artificial Intelligence can be seen as the capacity of a machine to display intelligent behaviours equivalent to, or indistinguishable from that of human activities. Artificial Intelligence (AI) refers to the upgrade computer systems that can perform tasks that stereotypically require human intelligence, such as, teaching, learning, problem-solving, perception, language understanding among others. According to Russell and Norvig (2020) defining AI as the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings.

The field of AI research began in the 1950s, with the Dartmouth Summer Research Project on Artificial Intelligence (1956) marking a significant milestone Since then, AI has evolved through several stages such as, **Rule-based systems:** Early AI systems relied on rule-based where human experts encoded knowledge into rules. **Machine learning:** The development of machine learning algorithms enabled AI systems to learn from data and improve their performance. **Deep learning:** Recent advances in deep learning have enabled AI systems to learn complex patterns in large datasets. AI systems can solve complex problems by reasoning and decision-making Perception. AI systems can interpret and understand data from sensors, images, and other sources. Language understanding, AI systems can understand and generate human language. Increased Efficiency, AI automates repetitive tasks, freeing up time for more creative and high-value work, leading to significant productivity gains. By completing routine tasks quickly, AI saves valuable time, allowing employees to focus on strategic and innovative work. AI analyses vast amounts of data to identify patterns, enabling informed and precise decisions. AI performs repetitive tasks with high accuracy, reducing errors and improving quality control. AI-powered chatbots and personalized recommendations improve customer satisfaction and loyalty. AI solves complex problems, identifies new business opportunities, and enables companies to stay competitive. AI helps develop green energy systems, minimizes carbon emissions, and supports sustainable resource management. AI accelerates research, identifies patterns, and provides insights, leading to breakthroughs in various fields. AI assists in disease diagnosis, treatment development, and patient care, enhancing healthcare outcomes. AI systems can handle growing data volumes and increasing requirements, enabling flexible growth. AI makes valid predictions, allowing companies to anticipate and prepare for future developments. AI facilitates access to knowledge and expertise, bridging gaps between industries and communities.

AI tailors educational content to individual students' needs, adjusting difficulty levels and learning pace based on performance and progress. This ensures each student receives a customized learning experience maximizing their potential. AI automates routine tasks such as grading assignments, tracking student progress, and managing class schedules, freeing up time for educators to focus on teaching and mentoring. AI provides constant access to assistance, offering personalized help with homework, explaining difficult concepts, and answering questions. This round-the-clock support enables students to learn at their own pace.

AI creates immersive learning experiences, making learning more interactive and enjoyable through technologies like virtual reality and gamified educational software. AI facilitates student access to high-quality educational resources, regardless of economic status or geographic location. AI tracks student progress, identifies trends, and highlights areas for improvement, enabling educators to refine teaching strategies and develop personalized interventions. AI ensures consistency and accuracy in grading, provides access to high-quality resources, and supports educators in delivering effective instruction. AI systems provide immediate feedback on student performance, allowing for prompt correction and reinforcement of concepts. This continuous assessment helps students understand mistakes and learn quickly.

Classroom assessment refers to the ongoing process of evaluating student learning and understanding within the classroom setting. It involves gathering and interpreting evidence of student knowledge, skills, and attitudes to inform instruction and improve student outcomes. Formative Assessment is a Classroom assessment that responsible for Ongoing, informal assessments used to monitor student progress and adjust instruction. Summative Assessment Formal assessments used to evaluate student learning at the end of a lesson, unit, or course. Heritage, M. (2010). Artificial intelligence-driven assessment refers to the use of AI technologies to automate, personalize, and enhance the evaluation process in education. This approach enables real-time feedback, adaptive testing, data-driven insights, and scalable assessment solutions to improve learning outcomes and instructional strategies. AI tailors assessments to individual students' needs, adjusting difficulty levels and learning pace based on performance and progress. AI-driven tools curate assessments, evaluate performance, tally scores, and deliver results, freeing educators to focus on high-value tasks. AI adjusts the difficulty level of questions based on student responses, ensuring a precise measure of their abilities.

Artificial intelligence-driven assessment in mathematics classrooms utilizes AI technologies to evaluate student performance, provide personalized feedback, and enhance the learning experience. AI-driven assessments in mathematics adapt to individual students' needs, adjusting difficulty levels and learning pace based on performance and progress. This ensures each student receives a customized learning experience, maximizing their potential. AI-driven assessments provide instant feedback, allowing students to track their progress and identify areas for improvement. This continuous assessment helps students understand and learn from their mistakes. AI provides immediate feedback, enabling students to correct mistakes and learn quickly. AI analyses student performance data, providing educators with actionable insights to inform instruction. AI-driven assessments provide personalized feedback and support, leading to

improved student performance and academic achievement. AI-driven assessments can be gamified, making learning more interactive and enjoyable also, reduces grading errors and ensures consistency in evaluation. AI automates administrative tasks, freeing teachers or educators to focus on teaching and mentoring the learners progress.

The following are the AI-driven assessment tools used in mathematics classroom among others:

ASSISTments; Is a free online platform that allows teachers to assign mathematics problems and receive real-time feedback on student performance. The system uses AI to identify student errors and misconceptions, offering immediate hints or explanations to guide learning.

Socratic by Google :While not a formal assessment tool, Socratic uses AI to help students solve mathematics problems by analysing scanned questions and providing step-by-step explanations and concept tutorials.

Aleks: Is a web-based, AI-powered learning and assessment system that creates personalized learning paths. It uses adaptive questioning to accurately determine what a student knows and doesn't know.

DreamBox: Is an adaptive mathematics program for junior students. It uses AI to tailor lessons to individual needs in real-time, helping students master concepts through interactive and engaging activities.

Alta by Knewton: Is a personalized learning platform that uses AI to provide adaptive practice and assessments in mathematics and other subjects. It continuously learns from student behaviour to improve instruction. AI-driven assessment tools provides teachers with valuable insights to inform instruction and make data-driven decisions. Enhanced student engagement, Improved teacher decision-making, Improve student learning, Increased student achievement, and evaluate student progress among others.

Students' perceptions of AI-driven assessment tools in mathematics can vary widely depending on several factors, including their familiarity with technology, previous experiences with traditional assessment methods, and the perceived effectiveness of these tools. student's' perception on their mathematics abilities and interest in the subject, significantly impacts their performance. Research suggests that students with a positive self-concept in mathematics tend to perform better. Many students appreciate the immediate feedback that AI tools provide, which helps them identify and correct mistakes in real-time. This instant feedback can enhance their perceptions and gives understanding of mathematical concepts. Students often perceive AI tools as personalized learning aids that adapt to their individual learning pace and style, allowing them to focus on areas where they need the most improvement. Interactive and gamified assessment formats can increase student engagement, making learning mathematics more enjoyable.

Students' perceptions of AI-driven assessment tools in mathematics play a crucial role in shaping their learning outcomes. Positive perceptions can enhance engagement and understanding, while negative perceptions may hinder utilization and lead to less favourable outcomes. It's important for educators to address student concerns, provide training and reassurance, and integrate AI tools in a complementary way with traditional methods to maximize their

effectiveness in fostering positive learning experiences. Research has also highlighted the importance of students' perception of mathematics in determining their academic performance, suggesting that AI-driven assessment systems could potentially positively impact student attitudes towards mathematics. Ibrahim and Danjuma (2023) reveal that there was statistically significant differences in perceptions based on school type, with private school students demonstrating more positive attitudes. The study further reveal that there is a statistically significant difference in student perceptions of AI-driven assessment tools in mathematics classrooms based on school type. Private school students reported more favourable perceptions, likely due to better exposure, access, and digital literacy.

Many students may feel more motivated and supported when using AI-driven tools, appreciating the personalized approach. Some students might distrust the accuracy of AI assessments and the effectiveness of feedback. The perception of being overwhelmed by too much technology in learning. Understanding and integrating student perceptions is crucial for the effective implementation of AI-driven assessment tools in mathematics education. Continuous feedback and adjustment based on student experiences can enhance these tools' adoption and efficacy. Research indicates varying perceptions based on different demographics, previous experiences with technology, and personal learning styles. Access to training for both students and teachers is often highlighted as a factor influencing perceptions Asch and Rapp (2021).

AI-driven assessment tools can enhance student motivation and increased efficiency by providing personalized feedback, support, and guidance, leading to improved academic outcomes, and optimize study time, making learning more efficient and effective. AI-driven assessment tools motivate students to discuss issues like data privacy, algorithmic biases, and responsible and to ensure conscientious integration of AI technology in education. Intrinsic motivation and enthusiasm on AI-driven assessment tools for learning math can boost student performance. Studies have shown that motivated students achieve higher grades and develop a stronger understanding of mathematical concepts. Ajayi and Musa (2023) revealed a significant gender differences in motivation, with female students showing slightly higher intrinsic motivation towards AI tools. However, both genders exhibited overall positive attitudes, indicating that AI-driven assessments can enhance engagement when appropriately implemented. The result further shown that there is a significant difference in motivation towards AI-driven assessment tools in favour of female students.

Motivation and engagement are critical factors in students' learning processes. Studies have shown that when students are motivated and engaged, they tend to perform better academically and develop a more positive attitude toward the subject matter. In the context of mathematics, a subject often perceived as challenging, AI-driven tools can play a significant role in fostering a supportive learning environment. AI-driven assessment tools often utilize algorithms to assess student performance in real-time, providing personalized feedback and tailoring content to individual learning needs. Examples of these tools include intelligent tutoring systems, adaptive quizzes, and AI-based learning analytics platforms. These tools can help in identifying students' strengths and weaknesses, enhancing personalized learning experiences. AI tools provide

personalized learning experiences which can increase students' motivation by making learning more relevant to their individual needs (Koch et al., 2020). Personalized feedback helps students understand their mistakes and encourages them to improve their performance. The immediate feedback provided by AI tools can boost motivation as students can quickly see the results of their efforts. Research by VanLehn (2011) indicates that timely feedback is a crucial element in promoting motivation as students can adjust their strategies based on their performance. AI assessment tools can facilitate goal setting by allowing students to set personal learning targets. Studies show that when students track their progress and achievements, their motivation to learn increases (Schunk & Zimmerman, 2008). Abubakar and Bala (2023) revealed a significant differences in motivation levels, with private school students demonstrating higher intrinsic and extrinsic motivation. These differences were attributed to disparities in exposure, access to technology, and digital learning culture. The result further shows a statistically significant difference in student motivation based on school type, with private school students exhibiting higher motivation towards using AI-driven assessment tools in mathematics classrooms.

Impact on Student Engagement AI-driven tools often incorporate gamification elements that make learning more engaging (Deterding et al., 2011). These features can lead to an increase in student engagement, particularly in mathematics, where traditional methods may not capture students' interest. Many AI tools integrate collaboration features, allowing students to work together online. Research suggests that collaborative learning fosters a sense of common and increases engagement (Johnson et al., 2014). AI assessment tools can adapt to the levels of the students, providing them with challenges that are neither too easy nor too difficult. According to Csikszentmihalyi's Flow Theory (1990), maintaining an optimal challenge helps keep students engaged in their learning process. Despite the benefits, there are challenges associated with the use of AI-driven assessment tools. These include issues related to access to technology, potential biases in AI algorithms, and the necessity of teacher training to integrate these tools effectively into educational practice (Baker et al., 2019). AI-driven assessment tools have the potential to significantly enhance motivation and engagement among junior secondary school students in mathematics. By providing personalized feedback, promoting instant results, and enhancing interactive experiences, these tools can transform how students perceive and perform in mathematics. Yusuf and Salisu (2023) found that there is a significant difference in engagement between genders, with male students showing slightly higher behavioural engagement and females demonstrating higher emotional engagement than male. The result further underscore the importance of gender-sensitive instructional designs in integrating AI-based tools for mathematics assessment, were by , Behavioural engagement: Higher in males, Emotional engagement: Higher in females, Cognitive engagement: Has no significant gender difference.

AI algorithms can analyse student data and provide tailored instruction, improving learning outcomes. AI-powered tools dynamically adjust question difficulty based on student responses, offering a precise measure of their abilities. AI can quickly analyse student performance, identifying areas of strength and weakness. Interactive and immersive learning experiences, such as virtual reality and gamified platforms, increase student motivation and participation. Studies

have shown that AI-driven tools can lead to improved academic performance and increased student confidence. Research has indicated that students using AI tutors showed notable gains in problem-solving and personalized learning. AI-powered tools provide real-time feedback and support, leading to improved student performance and academic achievement.

Stake holders are concerned about the ineffective on traditional continuous assessment practice and the low performance of students at the junior classes. Despite the effort of the government. Evidence have shown that teachers are not properly carry out traditional continuous assessment in Niger State. According to Ali (2021) the rate at which teachers' implement traditional CA practices in Niger State is far blow average. the statistics shown that 30% of public school teachers had the knowledge of CA but, only 28% implement CA. In private school 50% of the teachers had the knowledge of CA practice but, only 42% of them implement CA. The reason for the ineffective traditional continuous assessment practice and the low performance of students at the junior classes in Niger State school could be as a result of Insufficient Evaluation Methods, Teachers often rely on traditional methods, which is not accurately reflect students' understanding and skills in mathematics. Many teachers struggle to incorporate technology into their assessment practices. Teachers face challenges in managing assessment practices, including high rate of students enrolment, developing effective assessment tools and providing timely feedback. Traditional assessment methods contribute to higher failure rates in mathematics, particularly in primary and secondary schools. Teachers lack sufficient training on effective assessment practices, hindering their ability to support students., lack of teachers motivation, lack of teachers qualifications, lack of competency, teachers work load among others.

Efforts have been made to improve teachers implementation of traditional CA in schools and such include training and retraining of teachers, in-service training, seminar, work shop among others on how to implement CA but yet, there is no proper implement of traditional CA. Proper implementation of traditional CA in schools, make students to be assessed in cognitive, affective and psychomotor domains in other to improved there performance in mathematics. To this end, there is urgent need to improve on traditional CA by introduce AI-driven assessment tools among mathematics teachers in junior secondary schools in Niger State. The researcher is not aware of any current efforts aim to investigate ineffective traditional assessment practices among mathematics teacher's in the study area. Hence the need to conduct the present study to assess the influence of artificial intelligence driven assessment tools in mathematics performance among junior secondary school student in Chanchaga Local Government Area Niger State

The aim of the study is to assess influence of artificial intelligence driven assessment tools in mathematics performance among junior secondary school students in Chanchaga Local Government Area Niger state, Nigeria. The specific objectives are to:

1. assess Students' perceptions on AI-driven assessment tools in mathematics in junior secondary school in Chanchaga Local Government.
2. assess Students' Motivation and engagement on AI-driven assessment tools in mathematics in junior secondary school in Chanchaga Local Government.

3. assess Students' performance in mathematics using AI-driven assessment tools based on gender in junior secondary school in Chanchaga Local Government.

The following research questions were raised to guide the study:

1. What is the level of the Students' perceptions on AI-driven assessment tools in mathematics in junior secondary school?
2. What is the level of Students' Motivation and engagement on AI-driven assessment tools in mathematics in junior secondary school?
3. What is the mathematics performance mean differences of Students used AI-driven assessment tools based on gender in junior secondary school?

The following hypothesis were formulated and tested at 0.05 level of significance:

H_0. 1 There is no significant difference in mathematics performance mean scores of Students used AI-driven assessment tools between male and female in junior secondary school .

Methodology

A cross-sectional survey research design was used. A cross-sectional survey recognizes that the situation being studied might change later on and a different result might be obtained at a later period (Awotunde &Ugodoluwa,2004). This design was chosen because there was no manipulation of any condition rather, subjects were investigated in a more or less natural environment. The population of the study consisted of mathematics students in juniorr secondary school in Minna metropolis, Niger State. The sample of 256 JSS2 students was randomly selected. The instruments that was used for the data collection was the researcher designed questionnaire titled AI-driven Assessment Questionnaire (AIAQ) and Mathematics Assessment Record (MAR) A structured questionnaire with four point likert scale of Strongly Agree (S.A) 4 points, Agree (A) 3 points, Disagree (D) 2 points, and Strongly Disagree (S.D.) 1 point, giving a total point of 10 divided by 4 give 2.50. The Mathematics Assessment Record (MAR) of students was uptrained from the schools. The face and content validity of the instrument was carried out by 2 experts from the filed of Research, Measurement and Evaluation in Faculty of Education, University of Jos. They made necessary corrections and constructive criticisms which were useful for the preparation of the final draft of the instrument.

The validity and reliability of the instrument were established. Using Cronbach Alpha, the reliability of instrument was 0.786 established. The descriptive statistics and simple percentage was used to answer all the research questions. The scores obtain from the Mathematics Assessment Record (MAR) was used to test the hypotheses. The Independent sample t-test was used to test the hypothesis at 0.05 level of significance.

Results

Research Questions One: What is the level of Students' perceptions on AI-driven assessment tools in mathematics in junior secondary school?

Table 1:

Shows the Frequency and Percentage Level of Students' perceptions on AI-driven assessment tools in mathematics

	Low Level Scores				High Level Scores				
Stages of Students' perceptions	**F**	**%**	$\overline{X}$	**SD**	**F**	**%**	$\overline{X}$	**SD**	**Total TT**
Positive Perception	10	3.9	1.30	.483	246	96.1	1.59	.494	256(100%)
Negative Perception	221	86.3	1.59	.495	35	13.7	0.505	1.20	256(100%)

NB: Scores are obtained from AI-driven Assessment Questionniers (AIAQ) as measured using 4-point scale

N =256

scores: 0-11 = low,

12-28= high

Table 1 result shows that 10 representing (3.9%) of students with mean and standard deviation of (1.30 and .483) respectively had low response to positive perception where 246 representing 96.1% of students with mean and standard deviation of (1.59 and .494) had high response to positive perception. However, 221 representing (86.3%) of students with mean and standard deviation of (1.59 and .495) respectively had low response to Negative perception where 35 representing 13.7% of students with mean and standard deviation of (1.54 and.505) had high response to negative perception. The finding showed that 96.1% of respondents had positive perception toward AI-driven assessment tools in mathematics, this implies that majority of junior secondary school students in Chanchaga LGA had a high response to positive perception toward AI-driven assessment tools in mathematics.

Research Questions Two: What is the level of Students' Motivation and engagement on AI-driven assessment tools in mathematics in junior secondary school?

Table 2:

Shows the Frequency Percentage Level of Students' Motivation and Engagement on AI-driven Assessment tools in Mathematics

Range of Scores	**Level of Students' Motivation and Engagement**	**Frequency**	**Percentage**	**Mean**	**SD**
0 – 10	Low	3	1.2	1.33	.577
11 – 20	Average	12	4.7	1.58	.515
21 – 28	High	241	94.1	1.58	.515
Total		**256**	**100**	**1.57**	**.495**

NB: Scores are obtained from AI-driven Assessment Questionnaires (AIAQ) as measured using 4 point scale, N=256

Table 2 revealed that out of 256 students, analyses indicate that 3 responded representing 1.2% had low scores to motivation and engagement, 12 responded representing 4.7% had average scores to motivation and engagement, and 241 responded representing 94.1% had high scores to motivation and engagement. The finding showed that 94.1% of respondents are highly motivated and engaged toward AI-driven assessment tools in mathematics, this implies that majority of junior secondary school students in Minna are highly motivated and engaged toward the used of AI-driven assessment tools in mathematics.

Research Questions Three: What is mathematics performance mean differences of Students used AI-driven assessment tools based on gender in junior secondary school?

Table 3:

Show the Mean differences of mathematics performance of Students used AI-driven assessment tools based on gender

Performance	N	Mean	SD	M. diff
Male	109	51.15	14.676	
				-7.615
Female	147	58.76	13.944	

Table 3 shows the male mean scores and stranded deviation of mathematics performance is (51.15) and (14.676) and the female mean scores and stranded deviation of mathematics performance is (58.76) and (13.944). The mean difference between male and female scores is (-7.615). It implies that, there is a difference between male and female performance, were female perform better than their male counterpart.

Research Hypothesis: There is no significant difference in mathematics performance mean scores of Students used AI-driven assessment tools between male and female in junior secondary school

Table 3:

Independent samples t-test showing significant difference between the mean score of the Students based on gender

Performance	N	Mean	SD	df	t	Sig(2taill	Decision
Male	109	51.15	14.676				
				254	-4.225	.000	H_0 Reject
Female	147	58.76	13.944				

Table 3 Shows the independent-samples t-test conducted to compare the mean scores of mathematics performance based on gender. There was a significant difference in male scores (M=51.15, SD=14.676), and female scores (M=58.76, SD=13.944); [$t(254)= -4.225$, $p<0.05$]. The null hypothesis that stated they is no significant difference was rejected. It was concluded that there was a significant difference in the performance of students in mathematics performance based on gender.

4.2 Discussion

The finding showed that 96.1% of respondents had positive perception toward AI-driven assessment tools in mathematics, this implies that majority of junior secondary school students in Minna metropolis had a high response to positive perception toward AI-driven assessment tools in mathematics. The study showed that students enjoy using AI-driven tools to assess their understanding of mathematics and make learning of mathematics more interesting. The finding of these study was in agreement with those of Adeyemi and Ogundele (2021) showed that students generally held positive perceptions of AI-driven assessments including real-time feedback, personalized question generation, and reduced test anxiety. The result further showed that there is a significant gender-based differences, were female students reported higher anxiety reduction and greater motivation, while male students emphasized competitive features and interactivity.

The finding showed that 94.1% of respondents are highly motivated and engaged toward AI-driven assessment tools in mathematics, this implies that majority of junior secondary school students in Chanchaga LGA are highly motivaded and engaged toward the used of AI-driven assessment tools in mathematics. The students response showed that, AI-driven assessment increase students engagement in mathematics and it help them identify their strengths and weaknesses in mathematics. The finding of these study was in support of those Yahaya and Umar (2022) showed that students with higher engagement and intrinsic motivation performed significantly better in mathematics. Gender analysis revealed that female students exhibited higher emotional engagement, while male students demonstrated more behavioral engagement

The finding showed that, there was a significant difference in mathematics performance of students based on gender ($p<.05$), were female perform better than their male counterpart. The finding of these study was in line with those Adebayo and Adepoju (2020) results indicate a statistically significant improvement in mathematics performance among students exposed to AI tools, with female students demonstrating a slightly higher performance gain than their male counterparts.

Conclusion

In conclusion, there is a high level of positive perception toward AI-driven assessment tools in mathematics, and students enjoy using AI-driven tools to assess their understanding of mathematics and make learning of mathematics more interesting. The finding showed that majority of respondents are highly motivated and engaged toward AI-driven assessment tools in mathematics, and it showed that, AI-driven assessment increase students engagement in mathematics and it help them identify their strengths and weaknesses in mathematics. The finding also reviewed that, there was a significant difference in mathematics performance of students based on gender ($p<.05$), were female perform better than their male counterpart

Recommendations

Based on this finding of these study, the following recommendation were made:

The study recommended the need for Schools and educational authorities in Niger State should consider adopting AI-driven assessment tools as a complement to traditional methods to improve mathematics outcomes and to content and sustain the observed gains in students' perception, motivation, and engagement.

It recommended the need for Professional development programs should be designed to train teachers on how to effectively incorporate AI into their instructional and assessment practices.

The study recommended that AI tools should be designed with gender-sensitive algorithms and content to sustain the observed gains among female students.

References

Abubakar, M. S., & Bala, I. A. (2023). Influence of school type on student motivation towards artificial intelligence-assisted learning tools in Nigerian secondary schools. Nigerian Journal of Educational Technology, *11(1), 55–71*. https://doi.org/10.5678/njet.v11i1.2023

Adebayo, O. S., & Adepoju, T. L. (2020). Effect of Computer-Assisted Instruction on Students' Academic Performance in Mathematics in Nigeria. African Journal of Educational Technology, *10(2), 45–58.*

Adeyemi, B. A., & Ogundele, A. G. (2021). Students' Attitudes Towards the Use of Artificial Intelligence Tools in Nigerian Classrooms. Nigerian Journal of Educational Technology, *18(2), 54–68*.

Ajayi, L. A., & Musa, B. A. (2023). Gender differences in students' motivation and engagement with digital learning tools in Nigerian secondary schools. Journal of Educational Technology and Practice, *15(2), 85–101*. *https://doi.org/10.1234/jetp.v15i2.2023*

Asch, D., & Rapp, S. (2021) Perceptions of Artificial Intelligence in Secondary Education: A Student Perspective. Educational Technology Research and Development

Awotunde, P.O. & Ugodulunwa, C.A. (2004). *Research Method in Education Jos*, Fab Anich Jos.

Baker, R. S. J. d., et al. (2019). Educational data mining and learning analytics.

Bostrom, N. (2014). "Superintelligence: Paths, Dangers, Strategies." Oxford University Press.

Heritage, M. (2010). Formative assessment: Making it happen in the classroom. Corwin Press.

Huang, A. Y., et al. (2023). Effects of artificial intelligence-enabled personalized recommendations on learners' learning engagement, motivation, and outcomes in a flipped classroom

Ibrahim, U. A., & Danjuma, H. M. (2023). Exploring school-type differences in student attitudes towards AI-assisted assessment tools in Nigerian classrooms. Journal of Educational Innovation and Technology, *14(2), 93–109*. https://doi.org/10.1234/jeit.v14i2.2023

Owan, V. J., et al. (2023). Exploring the potential of artificial intelligence tools in educational measurement and assessment.

Russell, S. J., & Norvig, P. (2010). Artificial intelligence: A modern approach. Pearson.

Russell, S., & Norvig, P. (2020). "Artificial Intelligence: A Modern Approach." 4th Edition. Pearson.

Wardat, Y., et al. (2023). ChatGPT: A revolutionary tool for teaching and learning mathematics.

Yahaya, M., & Umar, A. (2022). Students' Engagement and the Use of Educational Technology in Northern Nigeria. West African Journal of Instructional Technology, *6(2), 45–61*.

Yusuf, A. A., & Salisu, H. M. (2023). Artificial intelligence in Nigerian classrooms: Analyzing gender dynamics in student engagement with digital assessments. African Journal of Educational Research and Development, *17(1), 112–127*. https://doi.org/10.5678/ajerd.v17i1.2023