



Perceptions of Teachers and Students on the Usefulness of Artificial Intelligence in Science, Technology, Engineering and Mathematics Instruction in University of Nigeria

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Abstract

This study investigated the perceptions of teachers and students on the usefulness of artificial intelligence (AI) in planning, implementing, and evaluating Science Technology, Engineering and Mathematics (STEM) Instruction in the University of Nigeria. The study was guided by three research questions and three hypotheses. The study adopted descriptive research design. The population of the study was 385, comprising 137 teachers and 208 students. The sample of the study was 255 comprising 102 teachers and 153 students gotten through stratified proportionate random sampling technique. The instrument for data collection was Perceptions of Teachers and Students on the Usefulness of AI in STEM Instruction Questionnaire (PTSUAISIQ) in three clusters, which was properly validated by experts. The reliability indices of the instruments using Cronbach Alpha were 0.82 for planning, 0.79 for implementing and 0.73 for evaluating STEM instruction. Data were analyzed using mean and standard deviation to answer research questions, while hypotheses were tested using an independent samples t-test statistic at 0.05 level of significance. Findings showed that teachers and students have similar positive perceptions on the usefulness of AI in planning and implementing STEM instruction, showing the role of AI in promoting instructional design. However, they differ in evaluating instruction, indicating a need for caution in using AI in STEM evaluation. It was recommended that teachers and students should engage in discussion of the role of AI in evaluation to bridge perception gaps.

Keywords: AI in education, STEM Education, Teachers and Students, Perception Instructional Planning, Implementing and Evaluating.

Introduction

Artificial Intelligence (AI) seems to be utilized more frequently in many facets of human endeavors, including education. Integrating Artificial Intelligence (AI) in education could increase the efficiency and effectiveness of teaching and learning, enhance students' engagement and motivation and improve learning outcomes by developing in students, essential skills for this digital age. Essentially, Mathematics education can benefit from AI-driven tools and platforms that facilitate personalized learning, feedback and interactive engagement. However, the extent to which the adoption and implementation of AI to aiding mathematics literacy depend heavily on the perspectives and attitudes of key stakeholders, including both teachers and students. As the architects of the learning process, Nespor as cited in Yousef, Shashidar and Hassan (2022) opined that the way in

which teachers perceive their world influences their instructional practice which in turn, according to Hughes as cited in Brandmiller, Schnitzler and Dumont (2024) reports that the longitudinal effect of teachers' perception predicts students' perception and academic performance. Similarly, Badia and Iglesias (2019), report that science teacher conception reflects on their happiness or fear of use of technology in the classroom. How students view and relate to mathematics instruction, as well as how teachers engage with students in the classroom, may be influenced by their perceptions of mathematics and the teaching and learning of mathematics through the use of technology like artificial intelligence. Therefore, it is necessary to look into how instructors and students view the value of artificial intelligence (AI) in STEM (science, technology, engineering, and mathematics) education.



Mathematics is a fundamental subject that plays a vital role in our daily lives. Many of the technological advancements we enjoy today, from smartphones to medical imaging, rely on mathematical concepts and principles. Nwachukwu et al. (2023) observed that many modern advancements in these fields would not be possible without mathematical knowledge. Teaching mathematics in schools, provides students with the foundation they need to pursue careers in these fields and contribute to the development of new technologies. According to Ugwuanyi et al. (2020), the importance cannot be overstated, especially in today's technology-driven world. That is why the National Council of Teachers of Mathematics (NCTM, 2020) views mathematics as the science of pattern and structure with high but attainable curriculum standards required to produce a society that has both capability to think and reason usefully in knowledge and skill needed in any walk of life while The Mathematics Association of Nigeria (MAN) defines mathematics as the dynamic and creative study of patterns, structures, and relationships, which seeks to understand and describe the world around us through logical reasoning, problem-solving, and analytical thinking. It is a universal language that provides a framework for critical thinking, innovation, and discovery, and is essential for navigating the complexities of modern life (Bas, 2021). These skills are crucial in today's fast-paced, data-driven world, where individuals need to be able to analyze information, evaluate evidence, and make informed decisions with regard to benefits derivable from STEM Education. It has been observed that investing in STEM education is not an option but a necessity for the country's survival and prosperity (Vanguard Newspaper, 2025). The role of STEM education includes; bridging the skill gap for job creation, empowering women and closing the gender gap, driving innovation in renewable energy and national development for sustainable future (Vanguard Newspaper, 2025).

STEM education integrates instructions from Physics, Chemistry, Biology, and Mathematics to develop problem-solving and critical-thinking skills. STEM instruction refers to the process of teaching and learning mathematics, sciences and technology encompassing various components such as lesson planning, instructional delivery, assessment and feedback, practice and reinforcement, and mathematical modeling and problem-solving. It involves the intentional planning, implementation and evaluation of learning experiences that enable students

to acquire mathematical and technological knowledge, skills, and attitudes, and to develop problem-solving abilities, critical thinking, and communication skills. Science and technology instruction including Mathematics instruction are multifaceted process that involves the design and implementation of learning experiences that enable students to develop a deep understanding of mathematics and science concepts, procedures, and practices, and apply them to solve real-world problems (Afolabi, Lawal & Salaudeen, 2023; Luzano, 2024). Science instruction is a purposeful and systematic process of creating an environment that fosters students' acquisition of mathematical knowledge, skills, and attitudes, and enables them to apply mathematics and science to solve problems and make informed decisions (Okereke, 2020).

Despite concerted efforts of stakeholders in STEM education due to need to sustain advances in technology, existing literature reveals a global concern of low academic achievement in mathematics and other sciences across nations, especially in higher education (Organization for economic cooperation and development [OECD], 2019; Adeneye, Awofala & Fatade, 2023). Haleem as cited in Utaminingsih et al. (2023), maintained that conventional classroom methods fall short in providing immediate learning environment, quicker evaluations and increase engagement. Also, there is evidence that there is equally low number of students enrolling in for science, technology, engineering and mathematics subjects and workforce as a result of students' poor achievement (Ugwuanyi & Okeke, 2020). Efforts are made by various researchers to find remedy to the causes of poor students' performance in STEM, yet issues still endure. Badmus, Jita & Jita (2024) reveal in a study that lecturers non usage of instructional resources is among the major cause of under achievement in universities. Hence, the need to consider integrating Artificial intelligence (AI) in Science, Technology, Engineering and Mathematics instruction as an intervention that may improve achievement in STEM education.

The goal of the multidisciplinary field of artificial intelligence (AI) is to create intelligent computers that are capable of carrying out tasks that are normally completed by people (Mohamed et al., 2022). Artificial Intelligence (AI) is the study, design, and development of algorithms and systems that are able to make decisions based on their perceptions and experiences of their surroundings. Machine learning, natural language processing, computer vision, robotics, expert systems, and other subfields are all part of AI

(Sarker, 2021). These subfields apply a variety of approaches and strategies to enable machines to copy or emulate human cognitive capabilities. A key element of artificial intelligence is machine learning, which entails developing algorithms that let computers learn from data and gradually get better at what they do without explicit programming (Gaudet, 2022). Building intelligent systems that can carry out tasks on their own and adjust to various circumstances is the goal of artificial intelligence (AI) (Weber & Schutte, 2019). Natural language processing, and analyzing visual and aural input, generating predictions, reasoning, and creativity and planning are examples of skills of AI-enabled system or platforms (Swathi, Babu & Ayyavaraiah, 2019). AI is doing an increasing number of duties nearly as well as, and in some circumstances, better than, humans, according to the World Economic Forum (Elizabeth, 2024). The ability of AI systems to learn from experience, see patterns, and form opinions depends on networks of massive data, sophisticated algorithms, and powerful computers (Miller & Brown, 2018).

Based on its capabilities, features, and technologies, artificial intelligence can be generally divided into a number of classes that show how closely a certain machine or system resembles human intelligence. There are four primary forms of AI based on functionality, and when we discuss capacity, we can talk about Narrow AI (Weak AI), General AI (Strong AI), or General AI (Strong AI) (Russell & Norvig, 2016), namely; Reactive Machines: These artificial intelligence (AI) systems respond to the circumstances that are now in place without remembering the past or drawing on it to guide their choices. *Restricted Memory*: These AI programs have the capacity to retain prior encounters and utilize them to guide choices. *Theory of Mind*: These AI programs are able to comprehend and analyze human feelings and actions. *Self-Aware*: These artificial intelligence (AI) systems are mindful of their own existence. Last but not least, the technologies that underpin artificial intelligence (AI) include robotics, computer vision, deep learning, machine learning, and natural language processing (NLP) (IBM, 2023). Since many AI systems combine aspects from several categories, these categories are not exclusive of one another. As a result, different writers have varying categorization opinions. For instance, Doyle (2024) defines artificial intelligence (AI) into three major categories: classification models, prediction models, and generative models. In the context of education, especially in the sciences like

mathematics, According to Mohamed et al. (2022), AI can be used to empower, support, and direct teaching and learning. While generative AI focuses on creating new, original material by utilizing machine learning algorithms to identify patterns and structures in existing data, predictive and categorization AI models are used in CBT exams in Nigerian universities and ICT centers. The integration of artificial intelligence (AI), particularly generative AI, in education has the potential to transform the learning experience, making it more personalized, effective, and accessible as instruction tailored towards enhancing diverse learning styles and students' needs. AI can transform STEM instructions in various ways, impacting the key components of instruction: planning, implementing, and evaluating. Generative AI responds to text, sound, and visual prompts, allowing students to find answers quickly and easily from the comfort of their mobile devices and providing easy access to lesson materials through intelligent software.

In planning for STEM instruction, AI can play critical roles from aiding online conferences for education stakeholders in curriculum development, to Assisting teachers in crafting a roadmap or lesson plan, that can help students understand complex concepts starting from the knowns to unknowns, ensuring that the class remains focused and productive in achieving outlined educational goals. According to Miao et al (2021) AI saves teachers time that could be redirected towards students learning. AI-driven analytics can help teachers assess students' prior knowledge and help learning patterns, thereby enhancing the creation of personalized lesson plans. For instance, Del Pezo, Yagual, Ibadango and Brito, (2024) explored the use of AI in planning instruction and found that AI-powered systems can analyze students' data and provide personalized learning, leading to improved student outcomes. Similarly, García-Martínez, Fernández-Batanero, Fernández-Cerero and León (2023) investigated the effectiveness of AI-powered systems in mathematics (computational) science and found that AI-powered systems can provide real-time feedback and guidance, simulating human-like interactions and improving student learning outcomes.

In implementing STEM instruction, platforms like Carnegie learning use AI to adapt problem sets, based on individual students' performance, ensuring each learner practices at an appropriate difficulty level (Kereselidze, 2023). According to Kereselidze (2023), AI provides hands-on experience that would be difficult to replicate in a traditional classroom setting. It assists

in content creation, suggesting the latest videos and interactive modules to enrich STEM instruction (Pellas, 2023) AI-powered tools also enable the creation of virtual laboratories and simulations, allowing students to perform experiments in a digital environment without requiring expensive physical equipment. These virtual labs are particularly relevant for Nigeria, where many schools lack adequate science laboratories and practical teaching resources. The integration of Artificial Intelligence (AI) in mathematics instruction could show promising results. Chen et al. (2018) examined the use of AI-powered adaptive learning systems in implementing mathematics instruction and found that AI-powered systems can adjust the difficulty level of mathematics problems and provide personalized feedback, leading to improved students' engagement and learning outcomes. Kim (2024) claims that learner-supporting AI provides learners with individualized support directly (e.g., AI-powered adaptive tutoring, Du Boulay, 2016) and that there are also efficient TAC procedures and systems that treat teachers and AI as equal team members when planning individual and group learning activities in the classroom (Dillenbourg et al., 2018). In Nigeria, Dahiru and Zaitawa (2024) found that implementing instruction through AI systems, students are enabled progress through knowledge domain at their rate, while it is guaranteed that while the most brilliant is challenged, the slowest learner does not get lost in the process.

In terms of evaluating mathematics instruction, the Weigand, Trgalova and Tabach (2024) highlighted the potential of AI in automating assessment and grading in mathematics and STEM education. The researchers found that AI-powered systems can aid teachers analyze students' performance, identify areas of strength and weakness, and provide insights for instructional improvement. Bello (2020) also investigated the use of AI-powered systems in evaluating instruction and found that AI-powered systems can provide detailed feedback on student performance, identify knowledge gaps, and suggest targeted interventions to improve student learning outcomes. AI-driven analytics also help educators track student progress, identifying those struggling with specific topics and recommending targeted interventions (Kereselidze, 2023). By integrating AI into mathematics and science instruction, educators can create more dynamic, personalized, and effective learning environments that cater to diverse students' need. AI-based grading tools like Gradescope can evaluate complex mathematical proofs and physics

problems, offering detailed insights into students' errors (Gonzalez, Mattingly, Wilhelm & Hemingson, 2024). In science labs, AI-powered virtual assistants, such as Labster, guide students through simulated experiments, helping them understand concepts like chemical reactions or Newton's laws through interactive learning (Asencios-Trujillo, LaRosa-Longobardi, Gallegos-Espinoza, Piñas-Rivera & Perez-Siguas, 2024). This is due to the fact that educators are able to leverage AI technology to design dynamic learning environments that foster students' critical thinking, cooperation, and skill development. However, how teachers and students view AI's value will determine how widely it is used in STEM and math education. According to Odo et al. (2023), usefulness is the attribute of having utilitarian value or being practically useful to accomplish a goal. How instructors and students view the application of AI to improve STEM education is what is meant by usefulness in this context.

Operationally, perception can be viewed as the process by which individuals interpret and organize sensory information from their environment, shaping their understating and attitudes towards sensory information in STEM education. Previous research reports that Perception plays a significant role in mathematics instruction, influencing both students' and teachers' attitudes and behaviors. Perceptions are regarded by several researchers, as an important factor to be taken into account when attempting to understand and explain variability in students' performance in Mathematics (Hagan, Amoaddai, Lawer & Atteh, 2020). Perception is crucial because it affects how students and teachers approach mathematics instruction. Students' perception of mathematics can impact their motivation, engagement, and ultimately, their academic performance. Similarly, teachers' perception of their students' abilities and motivation can influence their instructional strategies and expectations. In University of Nigeria Nsukka, perceptions of teachers and students on the usefulness of AI in STEM instruction remain unexplored especially with respect to planning, implementing and evaluating instructions. Previous studies were mainly on utilization of AI to improve achievements without recourse to the opinions of teachers and students on its usefulness in STEM instruction. This study therefore investigated the perceptions of teachers and students on the usefulness of AI in STEM instruction in University of Nigeria, Nsukka, Enugu State.

Statement of the Problem

Science teachers and STEM education researchers continue to be troubled by the low academic performance of pupils in these subjects. Research findings condemn inadequate instructional methods and a failure to incorporate technology into STEM education. The use of technology in STEM education has the power to change the educational process, raise student interest, and raise academic performance. Still unknown, though, are how educators and learners view AI's value in STEM education, particularly at the University of Nigeria Nsukka. Adopting AI tools and platforms could help with issues like low achievement, but doing so will require a thorough knowledge of how teachers and students view and feel about AI in STEM education. In particular, it is necessary to look into how instructors and students at the University of Nigeria Nsukka perceive the value of AI in organizing, carrying out, and assessing STEM education. If AI technologies are employed in STEM instruction in University of Nigeria Nsukka, it may supply information on the level of use and teaching disposition on the use of this technique, which may proffer one of the best teaching strategies for undergraduate students in STEM education. However, no published research has documented the perception of professors and students on the effectiveness of AI in STEM instruction in the University of Nigeria, Nsukka (UNN). This was the subject of the study.

Purpose of the study

The purpose of the study was to determine the perception of teachers and students on the usefulness of artificial intelligence in STEM instruction at University of Nigeria, Nsukka, Enugu state, Nigeria. Specifically, the study determined the:

1. Perception of Teachers and Students on the Usefulness of Artificial Intelligence in planning STEM instruction.
2. Perception of Teachers and Students on the Usefulness of Artificial Intelligence in Implementing STEM Instruction.
3. Perception of Teachers and Students on the Usefulness of Artificial Intelligence in evaluating STEM Instructions.

Research Questions

The following research questions were posed for the study

1. What are the Perceptions of Teachers and Students on the Usefulness of Artificial

Intelligence in planning STEM Instruction at the University of Nigeria Nsukka?

2. What are the Perceptions of Teachers and Students on the Usefulness of Artificial Intelligence in Implementing STEM Instruction at University of Nigeria Nsukka?
3. What are the Perceptions of Teachers and Students on the Usefulness of Artificial Intelligence in evaluating STEM Instructions at University of Nigeria Nsukka?

Hypotheses

The following null hypotheses guided the study and were tested at 0.05 level of significance.

- H₀₁:** The perception of teachers and students on the usefulness of Artificial Intelligence in planning of STEM Instruction is not significant.
- H₀₂:** The perception of teachers and students on the usefulness of Artificial Intelligence in implementing STEM instruction is not significant.
- H₀₃:** The perception of teachers and students on the usefulness of Artificial Intelligence in evaluating STEM instruction is not significant.

Methods

This study adopted a descriptive research design. A descriptive research design according to Nworgu (2015), is a design which aims at collecting data and describing systematically, the characteristics, features or facts about a given population. The study was geared towards a thorough investigation of the opinions of teachers and students on the usefulness of Artificial Intelligence in planning, implementing, and evaluating instructions in Science, Technology, Engineering, and Mathematics (STEM) education. The population of the study was 385 comprising 137 teachers and 248 students, drawn from the departments of science Education, Faculty of Education and Industrial Technical Education Department, Faculty of Vocational Teacher Education, University of Nigeria, Nsukka. The sample of the study was 255, comprising 102 teachers and 153 students gotten through proportionate stratified random sampling techniques. This was to ensure fair representation of teachers and students from every unit of STEM education. The instrument for data collection was a ninety (90)-item questionnaire developed by the researchers and sub-headed Perception of Teachers and Students on Usefulness of Artificial Intelligence (PTSUAI) in STEM instruction in clusters. PTSUAI is divided into two parts, I and II. Part I comprises information on the

personal data of teachers and students used for the study while part II has questionnaire in three clusters ; A, B and C. Cluster A is Perception of Teachers and Students on Usefulness of Artificial Intelligence in planning STEM instruction Questionnaire (PTSUAIPSIQ), Cluster B is Perception of Teachers and Students on Usefulness of Artificial Intelligence in implementing STEM instruction Questionnaire (PTSUAIIISIQ), and Cluster C is Perception of Teachers and Students on Usefulness of Artificial Intelligence in Evaluating STEM instruction Questionnaire (PTSUAIESIQ). The instrument was validated by three experts in Measurement and Evaluation, Industrial technical Education and Mathematics Education. The corrections and inputs were used to modify some items before the final production of the instrument. The reliability

indices of the instrument were 0.82 for PTSUAIPSI, 0.79 for PTSUAIIISIQ, and 0.73 for PTSUAIESIQ using Cronbach alpha. The research adopted the 4-point rating scale of strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) to analyze data obtained from the respondents. These have the values of 4,3,2,1 respectively. 385 copies of the questionnaire were distributed and collected on the spot with the help of research assistants. The data generated were analyzed using mean and standard deviation, while hypotheses were tested using t-test of independent means at 0.05 level of significance. The criterion mean was placed at 2.5[(4+3+2+1)/4 = 10/4= 2.5]. Therefore, any mean score of 2.5 and above indicated agreement and any mean score below 2.50 was regarded as disagreement.

Results

Research Question One:

Table 1: Mean ratings and standard deviation on the Perceptions of Teachers and Students on the Usefulness of Artificial Intelligence in planning STEM Instruction at the University of Nigeria Nsukka

S/N	Item Statements	Teachers			Students		
		\bar{x}	SD	Decision	\bar{x}	SD	Decision
1	AI align science lessons with curriculum standards	3.68	0.66	A	2.95	1.19	A
2	AI updates lesson plans to include new scientific discoveries.	3.67	0.66	A	3.05	1.02	A
3	AI-generated lesson plans are as effective as teacher-created ones.	1.43	0.68	D	2.86	0.59	A
4	AI identifies gaps in student knowledge to inform lesson planning.	3.66	0.68	A	3.18	0.96	A
5	AI personalizes mathematics and science instruction for individual learning needs.	3.68	0.47	A	3.37	1.12	A
6	AI reduces time spent creating instructional materials	3.27	1.10	A	3.81	0.52	A
7	AI-generated science activities (e.g., simulations) are engaging	3.77	0.42	A	3.29	1.09	A
8	AI ensures lesson plans are culturally relevant.	3.43	1.09	A	3.25	1.00	A
9	Over-reliance on AI reduces teacher creativity	1.54	1.06	D	3.56	0.65	A
10	AI tools are too complex for educators to use.	3.14	1.28	A	1.67	0.68	D
11	AI helps distribute time effectively across science topics	1.54	0.50	D	3.53	0.74	A
12	AI recommends resources that match students' learning styles	3.68	0.66	A	3.27	0.99	A
13	AI improves collaboration among teachers for unit planning.	3.24	1.03	A	3.27	1.08	A
14	AI-generated plans lack flexibility for classroom adjustments	1.65	0.67	D	1.74	1.12	D
15	AI supports planning lessons for students with disabilities	3.64	0.70	A	3.59	0.77	A

16	AI streamlines organizing long-term science curriculum units	3.69	0.66	A	3.60	0.76	A
17	AI-generated materials accommodate multilingual learners.	3.60	0.66	A	3.60	0.73	A
18	Data privacy risks hinder my use of AI for planning.	1.43	0.68	D	1.50	0.75	D
19	AI helps prioritize key science concepts in lesson plans	3.66	0.68	A	3.58	0.80	A
20	AI identifies outdated content in existing science curricula	3.63	0.47	A	3.62	0.55	A
21	AI-driven lesson plans increase student curiosity	3.27	1.10	A	3.22	1.13	A
22	Schools need more training for AI integration in planning.	3.77	0.42	A	3.68	0.64	A
23	AI fosters interdisciplinary connections in science lessons.	3.43	1.09	A	3.37	1.12	A
24	AI tools are biased toward certain student groups.	1.54	1.06	D	1.61	1.10	D
25	AI reduces workload, allowing teachers to focus on pedagogy.	3.14	1.28	A	3.04	1.34	A
26	AI-generated plans lack real-world science applications.	1.54	0.50	D	1.63	0.63	D
27	AI helps design lessons for diverse classroom environments.	3.68	0.66	A	3.61	0.74	A
28	AI keeps science education updated with technology trends.	3.24	1.03	A	3.18	1.05	A
29	Students prefer lessons planned with AI assistance	1.65	0.67	D	3.86	0.57	A
30	AI is critical for future science curriculum development	3.64	0.70	A	3.56	0.78	A

Table 1 above shows the mean ratings and standard deviation on the perceptions of teachers and students on the usefulness of artificial intelligence in planning STEM instruction at the University of Nigeria Nsukka. Table 1 shows that twenty-two (22) items exceeded the criterion mean of 2.50 in teachers'

responses while twenty-five exceeded the criterion mean in students' responses. These items in teachers' responses are 1, 2, 4, 5, 6, 7, 8, 10, 12, 13, 15, 16, 17, 19, 20, 21, 22, 23, 25, 27, 28 and 30. For students the items are 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 15, 16, 17, 19, 20, 21, 22, 23, 25, 27, 28, 29 and 30.

Hypothesis One

Table 2: t-test analysis of the perception of teachers and students on the usefulness of Artificial Intelligence in planning of STEM Instruction

Variable	N	\bar{x}	SD	df	F	t	p	Decision
Teachers	102	90.02	9.03	253	.156	-1.278	0.074	NS
Students	153	91.04	11.17					

NS = Not Significant

Table 2 shows that the teachers had a mean score of 90.02 with standard deviation of 9.03 while the students had a mean of 91.04 with standard deviation of 11.17. Table 2 also showed t-value of -1.278 with a significant level of 0.074 which is greater than the

chosen p-value of .05 ($p > 0.05$). The null hypothesis (H_{01}) is therefore not rejected. Thus, the perception of teachers and students on the usefulness of Artificial Intelligence in planning of STEM Instruction is not significant.

Research Question Two:

Table 3: Mean ratings and standard deviation on the Perceptions of Teachers and Students on the Usefulness of Artificial Intelligence in implementing STEM Instruction at the University of Nigeria Nsukka

S/N	Item Statements	Teachers			Students		
		\bar{x}	SD	Decision	\bar{x}	SD	Decision
1	AI adjusts instruction in real-time based on student responses.	3.57	0.68	A	3.37	0.88	A
2	Virtual labs (AI-powered) enhance hands-on learning	3.48	0.85	A	3.30	0.95	A
3	AI provides instant clarifications during science lessons.	3.48	0.79	A	3.27	0.90	A
4	Students interact better with AI tutors than human teachers	1.47	0.67	D	1.69	0.88	D
5	AI simulations simplify abstract science concepts.	3.68	0.47	A	3.58	0.67	A
6	AI-driven games improve participation in science activities.	3.29	0.96	A	3.27	0.92	A
7	AI identifies disengaged students and suggests interventions	3.53	0.70	A	3.33	0.88	A
8	AI tailors instruction delivery to individual learning paces	3.26	1.12	A	3.11	1.14	A
9	AI supports multilingual explanations during lessons	3.17	1.20	A	3.00	1.21	A
10	Technical glitches disrupt AI-driven lessons.	3.04	1.27	A	2.82	1.26	A
11	AI helps teachers focus on mentoring, not lecturing.	3.11	1.25	A	2.90	1.29	A
12	AI reduces student-teacher rapport.	1.43	0.68	D	1.63	0.91	D
13	AI tools function reliably during classroom instruction	3.19	1.03	A	3.10	1.06	A
14	Schools lack infrastructure for AI implementation	3.03	1.27	A	2.60	1.34	A
15	AI promotes equitable participation in group activities.	3.39	0.92	A	3.21	1.02	A
16	Students feel uncomfortable with AI monitoring.	1.57	0.80	D	1.88	1.05	D
17	AI recommends real-time modifications to teaching methods	3.53	0.83	A	3.41	0.91	A
18	AI-generated visuals improve understanding of complex topics.	3.19	1.18	A	2.86	1.25	A
19	AI facilitates peer collaboration during science projects.	3.55	0.74	A	3.42	0.86	A
20	AI struggles to manage classroom discipline.	3.46	0.79	A	3.33	0.89	A
21	Students trust AI tools to answer science questions.	3.17	1.12	A	3.03	1.16	A
22	AI provides actionable insights during live instruction.	3.56	0.75	A	3.39	0.92	A
23	Teachers spend less time on administrative tasks with AI	3.25	1.13	A	3.10	1.17	A
24	AI-driven lessons overlook ethical dilemmas in science	1.63	0.90	D	1.78	1.03	D
25	AI adapts to diverse student backgrounds during instruction.	2.93	1.29	A	2.78	1.30	A
26	Students rely too heavily on AI for problem-solving.	3.14	1.22	A	2.84	1.25	A



27	AI improves communication of learning goals in class.	3.56	0.75	A	3.45	0.83	A
28	AI-powered tools are distracting in science lessons.	1.53	0.69	D	1.78	0.89	D
29	AI fosters independent learning during instruction.	3.09	1.21	A	2.88	1.24	A
30	Teachers need ongoing support to implement AI effectively	3.34	1.02	A	3.14	1.12	A

Table 3 above shows the mean ratings and standard deviation on the perceptions of teachers and students on the usefulness of artificial intelligence in implementing STEM instruction at the University of Nigeria Nsukka. Table 3 shows that twenty-five (25)

items exceeded the criterion mean of 2.50 in both teachers' and students' responses. These items in both teachers and students' responses are 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 29 and 30 respectively.

Hypothesis Two

Table 4: t-test analysis of the perception of teachers and students on the usefulness of Artificial Intelligence in implementing of STEM Instruction

Variable	N	\bar{x}	SD	df	F	t	p	Decision
Teachers	102	90.59	13.31	253	1.518	1.866	0.063	NS
Students	153	87.24	14.48					

NS = Not Significant

Table 4 shows that the teachers had a mean score of 90.59 with standard deviation of 13.31 while the students had a mean of 87.24 with standard deviation of 14.48. Table 4 also showed t-value of 1.866 with a significant level of 0.063 which is greater than the chosen p-value of .05 ($p > 0.05$). Thus, the null

hypothesis (H_{02}) of no significant difference was not rejected. Inference drawn was that there is no significant difference on the mean responses of both teachers and students on their perceived usefulness of Artificial Intelligence in implementing of STEM Instruction at the university of Nigeria Nsukka.

Research Question Three:

Table 5: Mean ratings and standard deviation on the Perceptions of Teachers and Students on the Usefulness of Artificial Intelligence in evaluating STEM Instruction at the University of Nigeria Nsukka

S/N	Item Statements	Teachers			Students		
		\bar{x}	SD	Decision	\bar{x}	SD	Decision
1	AI generates fair and comprehensive science assessments	3.54	0.85	A	2.95	1.19	A
2	AI accurately grades open-ended science responses.	3.56	0.82	A	3.05	1.02	A
3	AI feedback is specific enough to guide student improvement.	3.55	0.86	A	2.86	0.59	A
4	Automated grading reduces teacher workload.	3.58	0.80	A	3.18	0.96	A
5	AI overlooks creative answers in assessments.	1.74	1.02	D	1.74	1.12	D
6	AI tracks long-term student progress effectively	3.20	1.15	A	3.81	0.52	A
7	AI identifies misconceptions from assessment data	3.63	0.66	A	3.29	1.09	A
8	Students find AI feedback easy to understand.	3.25	1.21	A	3.25	1.00	A
9	AI assessments lack cultural sensitivity	1.62	1.05	D	1.74	1.12	D
10	AI reduces bias in grading science assignments.	3.54	0.78	A	2.86	0.59	A
11	Teachers trust AI-generated progress reports	3.51	0.88	A	3.45	0.84	A
12	AI evaluation tools are too time-consuming.	1.55	0.82	D	1.80	1.14	D

13	AI tailors assessments to individual learning levels.	3.15	1.06	A	3.22	1.11	A
14	Students benefit from AI self-assessment tools.	3.59	0.78	A	2.78	0.66	A
15	AI highlights areas for curriculum improvement.	3.53	0.82	A	3.48	0.91	A
16	Storing assessment data in AI systems risks privacy.	1.53	0.75	D	1.80	1.13	D
17	AI detects patterns in student performance trends.	3.56	0.84	A	3.50	0.84	A
18	Teachers override AI grading recommendations often.	3.52	0.83	A	2.80	0.66	A
19	AI suggests personalized study plans for students.	3.54	0.82	A	3.52	0.87	A
20	AI-generated rubrics improve grading consistency.	3.44	0.85	A	3.52	0.66	A
21	Students feel anxious about AI evaluation.	1.46	0.67	D	1.78	1.11	D
22	AI reduces time spent analyzing assessment data.	3.55	0.80	A	3.57	0.79	A
23	AI struggles to evaluate hands-on science skills	1.51	0.75	D	1.80	1.09	D
24	Schools use AI reports to enhance science programs.	3.55	0.82	A	2.76	0.68	A
25	AI fosters transparency in assessment criteria.	3.54	0.84	A	3.04	1.30	A
26	Teachers lack training to interpret AI data.	3.50	0.88	A	1.60	0.59	D
27	AI improves feedback speed for science lab reports	3.54	0.82	A	3.46	0.88	A
28	Over-reliance on AI undermines teacher expertise.	3.15	1.05	A	3.12	1.06	A
29	AI evaluates interdisciplinary science projects fairly	3.54	0.82	A	3.85	0.52	A
30	AI is essential for future assessment practices	3.58	0.79	A	3.44	0.87	A

Table 5 above shows the mean ratings and standard deviation on the perceptions of teachers and students on the usefulness of artificial intelligence in evaluating STEM instruction at the University of Nigeria Nsukka. Table 5 shows that twenty-three (23)

items exceeded the criterion mean of 2.50 in both teachers' and students' responses. These items in both teachers and students' responses are 1, 2, 3, 4, 6, 7, 8, 10, 11, 13, 14, 15, 17, 18, 19, 20, 22, 24, 25, 27, 28, 29 and 30 respectively.

Hypothesis Three

Table 6: t-test analysis of the perception of teachers and students on the usefulness of Artificial Intelligence in evaluating of STEM Instruction

Variable	N	\bar{x}	SD	df	F	t	p	Decision
Teachers	102	93.01	12.45	253	2.209	3.519	0.001	S
Students	153	87.05	13.77					

S = Significant

Table 6 shows that the teachers had a mean score of 93.01 with standard deviation of 12.45 while the students had a mean score of 87.05 with standard deviation of 13.77. Table 6 also showed t-value of 3.519 with a significant level of 0.001 which is less than the chosen p-value of .05 ($p < 0.05$). Thus, the null hypothesis (H_{03}) of no significant difference was not rejected. Inference drawn was that there is no significant difference on the mean responses of both teachers and students on their perceived usefulness of Artificial Intelligence in Evaluating of STEM Instruction at the university of Nigeria Nsukka.

Discussion of Findings

Findings on planning STEM instruction using AI showed that both teachers and learners shared similar views on the usefulness of AI to improve the first step in instructional delivery. Further finding also showed no significant difference between their views on the usefulness of AI. This may be because AI technologies not only give immediate feedback but support personalized learning that caters to individual needs. With positive perceptions from both teachers and students, educators can now gather valuable insights into cognitive abilities, tailor

instruction to meet individual needs and support academic growth in University of Nigeria Nsukka.

The findings align with Del Pezo, Yagual, Ibadango and Brito, (2024), who explored the work of Mr. Manzi, planned mathematics instruction and found that AI-powered system can analyze students' data and provide personalized learning, leading to improved student outcomes. It also buttresses those of García-Martínez, Fernández-Batanero, Fernández-Cerero & León (2023), who found that AI can provide immediate feedback and guidance to its users.

In implementing STEM instruction, the findings were similar to those of planning STEM instruction. These findings may be because AI-powered systems can enable its users to practice at appropriate difficulty level and provides hands-on experience, not easy, to get in traditional setting. The finding agrees with Keroslidze (2023) who found that AI provides hands-on experience that would be difficult to replicate in a traditional class room setting. This finding was corroborated by Chen et al. (2018), who examined the use of metaphor tools in implementing mathematics instruction and found that the systems can adjust the difficulty level of mathematics problems and provide personalized feedback.

In evaluating STEM instruction, there was a significant difference between teachers and students on the usefulness of AI in this aspect of instruction at 5% level of significance. This may be because, teachers may worry about AI's ability to fairly access complex students' work like open ended responses, while students may appreciate AI's quick grading systems which may reduce subjective evaluation. This finding agrees with the finding of Pellas, (2023). who found that AI grading tools like Gradescope can evaluate complex mathematical proofs and physics problems, offering detailed insights into students' errors. Similar findings by Dong et al. (2020) suggested identifying knowledge gaps for targeted intervention to improve students' learning outcomes.

Educational Implications of the Study

The following are the educational implications of the study:

1. The study revealed that AI can be integrated as a planning and implementing STEM instruction, but the differences in perception on evaluation indicates a need for clearer procedure on how AI can be used in assessments for fairness and accuracy.

2. Teachers should be trained on how to use AI efficiently in evaluating student performance and shaping perception different from tradition. Such training should emphasize AI's role in automated grading and personalized feedback.

Contribution to Knowledge

1. It provides empirical findings that AI is accepted in instructional design and delivery.
2. Unlike planning or implementing STEM instruction, the study provides awareness on how teachers and students view AI's role in assessment.

Conclusion

This study has shown that while both teachers and students recognize the potential of AI in enhancing the planning, and implementation phases of STEM instruction, divergence in perception of AI in evaluation is an area of concern to educators. Therefore, a more human-centred strategy to AI-based evaluation is very critical in this respect.

Recommendations

1. There should be integration of modules that educate students on how AI works in evaluating learning, including the benefits and limitations of such systems.
2. Workshop should be organized by educational authorities to help teachers understand and use AI tools in evaluating students' performance while addressing concerns of fairness and bias.

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