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ARTIFICIAL INTELLIGENCE AND TEACHING-LEARNING PROCESS IN EDUCATION INSTITUTIONS IN NIGERIA: A STUDY OF UNDERGRADUATE STUDENTS OF DELTA STATE UNIVERSITY, ABRAKA

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Abstract: *In recent years, there has been a growing interest in the application of artificial intelligence (AI) in education. AI is currently used in many areas of education, including administration in schools, learning adaptations, and expanding the accessibility of education. Although AI has a lot of potential benefits, there are obstacles that must be conquer before it can be put into practice. This study examined the relationship between AI and the teaching-learning process in education in Nigeria, specifically focusing on undergraduates at Delta State University, Abraka. A cross-sectional study approach was used in this study, which obtained data from 437 undergraduate students. A stratified sampling technique was used to select a sample of the respondents. To analyze the data for the study, the t-test, correlation, and linear regression analysis were employed. This study demonstrated the robust and beneficial relationship between artificial intelligence and the teaching-learning process in education in Nigerian. However, there are also difficulties with using AI in education. These difficulties include students' excessive reliance on technology, concerns about data security and privacy, unequal access, prejudice and discrimination, technological difficulties, and the decline of human values. The study concluded that in order to prepare their students for the challenges of the AI revolution, Nigerian educational institutions should educate and nurture their students. The use of AI has the potential to improve teaching-learning process, personalize learning to students' needs, and boost administrative effectiveness in school management. Ensuring fairness and inclusivity and the future of teaching in*

the AI age are crucial when creating AI-based educational systems.

Key words: *education; artificial intelligence; teaching-learning process; challenges; Nigeria.*

Introduction

Mentoring plays a critical role in the development of educators, offering a framework for professional growth and enhancing both teaching skills and reflective practices. As Stan (2018) emphasizes, mentorship is a dual process, where both the mentor and mentee grow. Mentorship in teaching is uniquely challenging, requiring a blend of empathy, communication, and professional expertise (Stan, 2018). This paper analyzes the core qualities that make an effective mentor in education, drawing on insights from scholarly work and practical guides.

Since John McCarthy first used the term artificial intelligence (AI) in 1956 at a Dartmouth College workshop, in which scholars discuss the opportunities and difficulties of building thinking machines, the field has advanced significantly. When funding from the United States and United Kingdom governments became extremely selective in 2094, AI research eventually came to a standstill. However, seven years later, the Japanese government took the initiative to fund AI projects, which rekindled the field. Yet by the late 1980s, funding was once more restricted because investors were unfamiliar with where the research was going. Investment and enthusiasm in AI surged in the 2020s due to advancements in machine learning and teaching (Kubassova et al., 2021). Since then, AI has advanced significantly in tandem with the introduction of potent computer hardware and innovative data management tools.

It is impractical to dispute the influence of the recent, quick developments in artificial intelligence research and applications in the fields of industry, medicine, and education. For instance, IBM's Watson is used in the field of education to improve students' real-time data gathering. This has changed the field of education and will continue to do so by making learning and teaching more advantageous, engaging, and effective. AI will eventually be incorporated into the classroom through a slow but effective process that will improve both the teaching and learning of both the teacher and the student. This is demonstrated by TeacherBots and OzoBots, which improve the abilities and skills of pupils while providing them with the knowledge they need for their individual studies (Zouhaier, 2023). In a similar vein, Kuok-Ho (2024) asserts that AI is the catchphrase in a world where machines and information technology are used more and more to perform a variety of tasks. Numerous industries, including education, have been impacted by

AI. In response to this new technological advance trend, the education sector has been quick to launch a wide range of courses on AI. In the meanwhile, it gains from the development and acceptance of AI, especially in the fields of education and learning.

A computer system that possesses AI is capable of performing human-like functions like learning, adapting, synthesizing, self-correcting, and using data for intricate processing jobs. It is the capacity of robots or computers to carry out operations like learning, reasoning, solving problems, and speaking that normally call for human intelligence. AI has multiple applications, including web search, self-driving cars, and speech recognition. The goal of this quickly developing branch of software engineering is to develop systems that are capable of doing tasks that are beyond the scope of human performance (Chen, Chen, & Lin, 2020). Education has undergone a dramatic change as a result of AI, which has made the transition from teacher-driven to student-centered easier. The students, who stand to gain the most from teaching and learning, have already noticed and experienced some of the changes. There has been a noticeable shift in the education sector towards student-centered learning and away from teacher-focused instruction. There is a growing interest in allowing students to take charge of their own education and actively participate in the process of learning as an alternative to traditional teaching methods where teachers serve as the primary authority and source of knowledge in the classroom. Teachers set the tempo, the activities, and the standards for the learning process when it comes to teacher-centered learning. Although it has the benefit of preserving order and guaranteeing that important topics are covered, it restricts student participation, teamwork, and innovation (Tang, 2021). In student-driven learning, teachers take on the role of guides or coaches as opposed to being the only source of information. This type of instruction can improve both the development of critical skills and competencies and the accessibility of education. The development of AI has the potential to support learning that prioritizes students by offering feedback, and individualized and adaptable learning experiences. It also aids educators or lecturers in creating resources and activities that successfully involve students and effectively satisfy their needs (Tang, 2021).

AI opens up possibilities for universities to add novel courses. This trains the specialists that are sorely required in AI-related areas and equips students with the skills to take on novel tasks in the age of AI. Universities and colleges can better position themselves by offering courses that are timely and attractive as a result of riding the AI wave (Chiu et al., 2022). Academic institutions can either provide AI as an academic subject or program that introduces students to the fundamental ideas and methods of AI, including deep learning, heuristic search,

unpredictability, engaging in games, and knowledge illustration and deductive thinking, or they can offer AI's spin-offs and specialized fields, like machine translation, visual processing, cyber-security, and information analytics (Tang, 2022). AI simultaneously transforms educational institutions teaching and learning, rendering it more engaging and focused on the needs of the students. AI technologies can lower cultural and language barriers, facilitate online and hybrid education, and provide academic possibilities to underprivileged and marginalized communities. It offers a crucial conduit for expanding the variety of learning styles and enhancing accessibility to higher education worldwide (Kuok-Ho, 2024). As a result, AI affects education across the board and at all levels, not just postsecondary education alone.

According to Kamath and Pai (2022), AI will generate more employment opportunities than it will eliminate by 2025, but these new positions will demand higher skill levels than their predecessors. Educational institutions, governments, and employers of labor should think about the best ways to create educational initiatives that give people the skills they require to thrive in today's marketplace as novel talents become apparent. Consequently, educational establishments must equip their students for professions in these sectors. More research is needed on the novel instructional roles, which call for a different set of graduate qualities. These roles place a focus on creative thinking and imagination, and a set of skills and abilities that are almost never replicated by technology. For example, students can receive guidance on how to use ChatBots to identify lapses in computer code or to receive critiques of the structure of an academic paper. Table 1 provides an overview of the various AI tools and how they enhance educational experiences.

AI Tools/ Frameworks	**Contribution to Educational Process**
AI-based Voice Assistants	Respond to queries from students, assist with assignments, impart knowledge, and conduct information searches.
Smart Education Framework	Help instructors create a particular course.
Wrist-Worn Wearables	Encourage interactive learning by providing activities to keep students intrigued.
Smart Glasses	Augmented reality learning is made possible by the ability to encasing digital content onto reality, document lectures and field research, and gain knowledge of students' learning processes to help teachers adapt their

	approaches to teaching to meet the needs of all students.
Virtual Reality Headsets	Create learning environments that are immersive, bringing abstract ideas to life and encouraging hands-on learning.
Interactive Tools	Use multimedia to give students a comprehensive grasp of a subject; use analytics to monitor students' advancement in their learning; and permit utilizing gamification.
Intelligent Tutoring Systems	Make use of AI tutors that can work with students, participate in turn-by-turn dialogues, and adjust to the debates. They can also provide pertinent feedback to inspire students on a personal basis, keep an eye on the connection between sentiments and acquiring knowledge, and offer encouragement to students when necessary.
Virtual Learning Environment	Offer materials, connections, and operations inside a framework while accounting for the various evaluation phases.
Natural Language AI Chatbots	Assist with language-related assignments, give students opinions, and make finding data easier

Table 1: AI Tools and their Educational Contributions
Source: Kuok-Ho (2024): Implications of AI in Education.

The methods of instruction and the relationship between students and teachers have changed significantly since education was first established. This change will be primarily ascribed to technology's ongoing intervention. Thanks to AI, education has become even more collaborative as teachers and students work together to achieve better results. According to Kandula (2020), (AI is currently providing educators and educational institutions new ways to assess how students are performing and to deliver content in a quick, tailored, and focused manner. The modern educational system has been able to draw a diverse range of learners and instructors to engage in technology-based learning by disseminating knowledge through social media sites or websites. With no restrictions on space, time, or student population, online learning is becoming more and more popular every day. Online learning offers several advantages, including adaptability, reduced expenses, and an extensive variety of content. However, it is still continuously evolving to maintain standard of education. AI is becoming a growing trend in the field of education. Everyone can see in greater numbers that it is crucial to accomplishing contemporary educational objectives and

presents a plethora of fascinating opportunities for learners to gain knowledge (Mureşan, 2023).

AI can also be used to develop engaging virtual aids and tutorials, which are programmes that can respond to queries from students, offer more clarification, and mentor them via their educational journey in contemporaneous fashion. Consequently, students can gain extra encouragement and advance knowledge at their own pace with immediate instruction to support their educational endeavours through instructional videos (Sanksshep, 2023). Nevertheless, according to Nuryadin (2023), there are a number of significant obstacles preventing AI from being widely used in education. These include students' excessive reliance on technology, concerns about security and confidentiality of data, access disparities, discrimination and prejudice, technological difficulties, and the erosion of value systems in educational settings. Research on AI and the method of instruction and learning in education has been carried out all over the world, but mostly in developed nations (Chen et al., 2020; Kandula, 2020; Mureşan, 2023; Zouhaier, 2023; Kuok-Ho, 2024), to name a few. In contrast, less developed countries, Nigeria included have the opposite situation, which leaves a research gap that the current study aims to close. Based on the aforementioned, this study investigated the association between AI and the teaching-learning process in Nigerian education, paying special attention to undergraduate students at faculty of management and social sciences, Delta State University' Abraka. In order to fulfil the study's objective, this null hypothesis was analyzed:

H_1: There is a significant relationship between artificial intelligence and teaching-learning process in education in Nigeria with particular reference to the undergraduate students of the faculty of management and social sciences, Delta State University, Abraka.

Research methods

This study used a cross-sectional research design, but the challenge was obtaining a large but well-defined population. To address this issue while saving time and money, a web-based survey with direct email communication was used. To increase response rates, a letter was sent to university administration requesting support for instructors and student involvement, a flyer was distributed to the faculty of social and management sciences and posted on notice boards, and the request for responses was promoted on the university's closed-circuit screens as required. An email notification was sent to everyone who took part through the e-Plugs email list. Out of the 500 students who received emails, 437 students, or 87.4% of the total, responded. In addition, 228 (45.6%) were female and 209 (41.8%) of the students who answered the survey were male students. Along with biographical information, a 25-

item designed survey with strongly agreed (A) to strongly disagreed (E) options was employed. In the initial segment of the questionnaire, participants were asked to provide personal information such as their age, gender, department, faculty, and academic standing. The relationship between AI and the teaching-learning process in education in Nigeria is examined in the second section. The instrument was validated before it was used by three (3) specialists from the political science and public administration departments, Delta State University, Abraka. To determine the instrument's dependability, pilot testing was done. The instrument was given to twenty undergraduate students at Delta State University Abraka and tested using the Smart Learning Style Criterion and the Cronbach Alpha reliability test.

Construct	No. of items	Composite Reliability	Cronbach's Alpha	Average Variance Extract
Artificial intelligence	10	.813	.759	.663
Teaching-learning process	10	.847	.784	.691

Table 1: Reliability Results
Source: Field Survey, 2024

Table 1 showed that the composite reliability values for the two constructs range from 0.813 to 0.847, while Cronbach's alpha values range from 0.759 to 0.784. The composite and Crombach's alpha coefficients exceed the cutoff of 0.70, indicating construct reliability (Hair et al., 2017). The Average Variance Extract (AVE) discriminant validity figures, which are also above the 0.50 threshold, back up the reliability findings (Hair et al., 2017). As a result, the study's two constructs had high internal consistency and reliability. The study's hypothesis analysis was carried out using T-test, correlation, and linear regression analyses with the help of Statistical Package for Social Sciences (SPSS) software version 23.0,

Results

The connection between the dependent and independent variables was investigated using bivariate analysis. If $p < 0.05$, reject the hypothesis due to insufficient evidence of an association; if $p > 0.05$, consent to the hypothesis as there is strong evidence of an association between the variables. This decision rule applies to results from bivariate assessments.

	Variables		Artificial intelligence	Teaching-learning process
Spearman's rho	**Artificial intelligence**	Correlation Coefficient	1	.836**
		Sig. (2-tailed)		.000
		N	437	437
	Teaching-learning process	Correlation Coefficient	.836**	1
		Sig. (2-tailed)	.000	
		N	437	437

**. Correlation is significant at the 0.05 level (2-tailed)

Table 2: Results of the Correlation between Artificial Intelligence and Teaching-Learning Process in Education
Source: SPSS Output, 2024

Table 2 illustrates the link between AI and the teaching-learning process in education in Nigeria using Spearman's correlation coefficients (rho = 0.836, N = 437, and P = 0.000). This finding implies that there is a substantial and beneficial relationship between AI and the teaching-learning process in the educational system. This finding implies that AI can support teaching-learning process in education in Nigeria. However, in a study like this, correlation computation is unfit to determine a cause or effect. To ascertain the effect of AI on the teaching-learning process in education in Nigeria, a linear regression technique was utilized.

Model	DF	Sum of Squares	Mean Square	F- Value	Pr > F
Error	1	21.6483	5.0000	27.5820	<.0005
Corrected	436	9.7695	0.8705		
Total	437	31.4178			

Table 3: Summary of Linear Regression Analysis
Source: SPSS Output, 2024

If the calculated value of F is higher than the tabulated value of F (F cal>F tab), we disapprove of the null hypothesis; if not, we consent to it. The F tabulated at the 95% level of significance ($\alpha = 0.05$) is as follows: F 0.05, (1, 437) = 5.5753. The calculated value of F, 27.5820, is higher than the tabulated value of F, which is 5.5753. With a 95% confidence level, the study's regression results verify that AI improves the teaching-

learning process in Nigerian schools. The findings demonstrated that AI significantly affects the teaching-learning process in Nigerian schools. AI as a teaching-learning approach makes learning more personalized, gives immediate feedback, and boosts evaluation effectiveness. Therefore, by integrating AI into online educational platforms, it is possible to tailor lessons and content to the unique nee and skill levels of each student. Furthermore, a number of factors some of which were tested at the Faculty of Management and Social Sciences, Delta State University Abraka, Nigeria have been identified in Western literature as potential barriers to the teaching-learning process via AI tools.

Challenges to Teaching-Learning Process via Artificial Intelligence	**Mean**	**Standard Deviation**	**Remarks**
Over dependence on technology by students	5.276	0.099	Supported
Data privacy and security issue	5.084	0.124	Supported
Inequality of access issue	4.830	0.105	Supported
Bias and discrimination issues	4.589	0.150	Supported
Technical challenges	4.250	0.174	Supported
Loss of human values in teaching process	3.724	0.143	Supported

Table 4: Challenges Associated with the Application of AI in the Educational Context in Nigeria
Source: SPSS Output, 2024

When using AI by students in the faculty of management and social sciences, Delta State University, they faced a variety of difficulties. These included students' excessive reliance on technology, concerns about data security and privacy, unequal access, prejudice and discrimination, technological difficulties, and the erosion of human values. Given that the mean scores ranged from 3.724 to 5.276, it is clear that the obstacles that were identified had a major detrimental effect on the teaching-learning process in education in Nigeria. Finding out whether male and female students have different perspectives on the obstacles posed by the use of AI in education in Nigeria is crucial at this point; the result is displayed in Table 5 below.

S/N	Variables	Group	N	Mean	SD	Cat.T	Crit.T
1	Over dependence on technology by students	Male Female	209 228	5.237 5.176	.458 .507	1.522	1.827
2	Data privacy and security issue	Male Female	209 228	5.163 5.005	.572 .589	1.539	1.851
3	Inequality of access issue	Male Female	209 228	5.100 5.261	.645 .600	1.517	1.866
4	Bias and discrimination issues	Male Female	209 228	4.446 4.597	.608 .634	1.506	1.842
5	Technical challenges	Male Female	209 228	4.372 4.500	.620 .633	1.551	1.825
6	Loss of human values in teaching process	Male Female	209 228	4.290 4.248	.621 .630	1.547	1.838

Table 5: The Opinion of Male and Female Students on Challenges Associated with the Application of AI in the Educational Context in Nigeria
Source: SPSS Output, 2024

All calculated "t" values (1.522, 1.539, 1.517, 1.506, 1.551, and 1.547) are less than the critical "t" value of 1.825 as shown in Table 5 above. This indicates that there is no difference in the opinions expressed by men and women students regarding challenges related to the use of AI in education in Nigeria.

Discussion of findings

This study surveyed the relationship between AI and the Nigerian educational system's teaching-learning process. The study's findings demonstrated an enduring and beneficial relationship between AI and the teaching-learning process in Nigerian educational system. This finding is consistent with Nuryadin's (2023) assertion that AI holds significant potential for enhancing the effectiveness and quality of education. AI contributes to more objective evaluations, more individualized learning for students, and effective administrative procedures. An inventive and comprehensive educational future is made possible by the use of AI in the classroom. This finding supports Kuok-Ho's (2024) assertion that AI has been used in education for a variety of objectives. AI is being used by smart content to produce electronic textbook instructions and adaptable learning platforms that are currently

being implemented at all educational levels, from the elementary schools, to post-secondary and corporate settings. AI systems that can target instructions based on the abilities and shortcomings of a student and adjust to their unique learning needs are known as intelligent tutoring systems.

The study's findings also revealed that AI has a significant impact on the teaching and learning process in Nigerian schools. According to previous research by Nuryadin (2023), Sanksshep (2023), and Kuok-Ho (2024), AI has played an important role in determining the teaching-learning process in education in recent years. The positive impact of AI on teaching and learning in Nigerian educational systems was consistent with previous findings. Chin (2018) argues that AI has significantly altered human behavior, including living, working, learning, and teaching. Consequently, rather than having only surface-level effects, AI entails serious changes in the teaching and learning process. Nuryadin (2023) argues that AI has changed not only how we learn and teach, but also how schools operate. Learning management systems, for example, use AI to handle student information, monitor attendance, and prepare lessons. The intensified administrative procedure will allow teachers to devote more energy to teaching. Furthermore, AI is used to improve educational accessibility. AI models enable students with specific needs to benefit from an educational experience that is tailored to their needs. AI is capable of helping students with disabilities related to learning through text-based or voice-based support, improving their ability to follow lessons. Artificial Intelligence (AI) holds significant promise for enhancing the effectiveness and quality of education in the rapidly evolving field. AI contributes to more objective assessments, more individualized learning for students, and more effective administrative procedures. An inventive and equitable educational future is made possible by the use of AI in the classroom.

Analyzing the challenges of implementing AI in Nigerian educational systems revealed that they impact the teaching-learning process. These challenges included students' over-reliance on technology, concerns about data security and privacy, unequal access, prejudice and discrimination, technological difficulties, and a decline in human values. The study also revealed the perspectives held by male and female students about the challenges posed by the use of AI in education in Nigeria. This is consistent with Suvrat and Roshita's (2019) findings, which found no significant difference in male and female teachers' perspectives on the impact of AI on student learning. However, Schiff (2021) agrees that excessive of AI is bad. This is because allowing students to fully utilize the capabilities of AI systems can be

counterproductive, contributing to student boredom and even reducing their artistic abilities. Therefore, as AI permeates the educational field, educators must urge students to use it to enhance their learning rather than become overly reliant on it.

Conclusion

The findings of this research show that AI has an effect on teaching-learning process in Nigerian educational systems. The study's findings offer strong proof that AI and the teaching-learning process in education have causal connections and are positively correlated. Overall, the findings demonstrate that there is a substantial and favorable correlation between AI and the teaching-learning process in education in Nigeria. According to the findings, AI has a stronger and positive influence on the teaching-learning process in Nigerian educational systems. The study's findings indicate that there are obstacles to the use of AI in education in Nigeria, including students' excessive reliance on technology, concerns about data privacy and security, unequal access, bias and discrimination, technological difficulties, and a decline in human values. This study indicates that there is no gender differences in the opinions expressed about the difficulties related to the use of AI in Nigerian educational systems.

The development of smart learning system is one area in which AI has been applied in Nigerian educational systems. This system analyses student data using AI to provide learning guidelines based on each student's unique needs. This system increases the effectiveness of learning and boosts performance in school by allowing students to learn at their own discretion and style. In addition, AI aids lecturers in skill development, student distribution of study materials, and performance evaluation via computer-based assessments. In conclusion, in order to prepare their students for the challenges posed by the AI tools, Nigerian educational institutions must educate and nurture their student population. Utilizing AI in education has a lot of potential advantages. While AI has the potential to improve education, provide individualized learning opportunities for students, and boost administrative effectiveness in schools, it is crucial to maintain equity and inclusivity when creating AI-based educational systems and worries about the privacy of student information, the decline in human connection, and the future of teaching in the AI age. Make sure AI is used in education in a way that upholds human values and fosters social relationships that are crucial to learning. AI can also help in developing an innovative educational setting that completely cultivates the skills necessary for success in a world characterized by constant digital transformation. These skills include personalizing learning, constantly and constructive

evaluation, fostering interpersonal relationships, promoting imagination and critical thinking, and cultivating complex skills for problem-solving.

Implications for Higher Education in Nigeria

In developed countries, AI has received a lot of attention in the field of education; however, in developing countries, like Nigeria, the situation is the opposite. More research on the relationship between AI and the teaching-learning process in Nigerian educational systems is therefore necessary in light of the aforementioned situation. The primary objective of this study was to address the wider calls in the discourse on AI to comprehend and expand knowledge about the field in order to provide a deeper awareness of the subject as it relates to Nigeria educational systems. The results emphasize how important it is for educational establishments in Nigeria to integrate AI-related expertise and skills into their curricula through AI training and project-based learning. More specifically, AI programming courses could be offered by Nigerian educational establishments. Using examples from the real world in project-based learning can give undergraduate students hands-on expertise in developing AI skills. This will give them the essential skills they need to succeed in a future workplace driven by AI. Adopting AI in Nigerian educational institutions requires creating a welcoming atmosphere that allays fears.

Limitations and Future Research Directions

This study's limitations stem from its narrow focus on a single Nigerian university and small sample size. Consequently, the study's results may not be universally applicable to other educational institutions in Nigeria or around the globe, nor are the participants and findings sufficiently representative. In light of this, it is recommended that future researchers conduct a comprehensive study of this scope in order to close the gaps that have been identified. Future studies could make greater use of a wider range of samples and qualitative methods to obtain deeper insights. Additionally, qualitative techniques like focus groups as well as interviews could reveal in-depth perspectives that would supplement the quantitative findings. Other limitations include a low rate of response and failure to generate an entirely random sample.

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