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Extent of Readiness of Automobile Technology Educators to Utilize Artificial Intelligence in Colleges of Education in South East, Nigeria

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ABSTRACT

The utilisation of Artificial Intelligence (AI) into educational practices has significantly transformed various disciplines, including Automobile Technology Education (ATE). This study addresses the readiness of educators to utilise AI within ATE in Nigerian colleges of education. In order to conduct this study, one research question and two hypotheses were formulated using descriptive survey research design. A population of 68 automobile technology educators in public colleges of education in South East, Nigeria was studied. A researcher-designed questionnaire containing 10 items with a reliability coefficient of 0.79 was used for data collection. Mean and standard deviation were used to answer the research question while t-test was used to test the null hypotheses at 0.05 level of significance. Findings of the study revealed that automobile technology educators have low extent of readiness to utilise AI in colleges of education in South East, Nigeria. Automobile technology educators in colleges of education in South East, Nigeria do not differ significantly in their mean ratings on the extent of readiness to utilise AI based on ownership type and gender. Conclusion and recommendations were suggested for the study.

Keywords: Colleges of education, automobile technology education, readiness

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INTRODUCTION

In this digital era, organizations across the globe are embracing technologies for In Nigeria, college of education is a specialized educational institution where students are expected to acquire the rudiments of the teaching profession within three years. Comprehensively, Onokpaunu (2023) asserted that colleges of education are teacher training

institutions that provide full-time and remedial courses in instructional methodologies, learning styles, school management, behavioural and sociological dispositions of children, adolescents and adults, philosophical and theoretical underpinning of subject matters as well as curriculum development of programmes across all areas of learning. One of the specialized areas of learning offered in colleges of education in Nigeria is automobile technology education. Automobile technology education is a technical education programme in colleges of education that is concerned with the design, construction, maintenance and repairs of old and modern automobiles. According to Mustapha, Idris, Kutiriko and Ewugi (2016), automobile technology education is a specialized programme that enable students to acquire specialized knowledge and skills required for the construction, repair and maintenance of vehicles consisting of two, three and four wheels powered by engines.

In recent times, automobile technology education in colleges of education also exposes students to the evolution of intelligent automobiles that led to the emergence of self-driving cars, connected cars and electric vehicles. Audu et al. in Wahab, Saka-Alikinla, Aliyu and Ojo (2020) postulated that automobile technology education is one of the Technical Vocational Education (TVE) programmes which involve the acquisition of scientific knowledge in design, selection of materials, construction, operation and maintenance of motor vehicles. The curriculum for automobile technology programme in Nigerian colleges of education typically covers a wide range of subjects related to automotive engineering (Ndirmbita & Bwala, 2019). Students are exposed to courses such as automotive design, vehicle dynamics, engine technology and automotive electronics. This implies that, upon graduation, graduates of automobile technology education in colleges of education are expected to efficiently carry out maintenance work and repairs on different types of automobile engines. The preparation of automobile technology education students from colleges of education to the automobile industry falls on the professional shoulders of automobile technology educators. Automobile technology educators are operators of automobile technology education curriculum that are motivated to produce highly skilled automobile technology students that will meet the needs of the various stakeholders in the automobile market.

One of the instructional avenues through which automobile technology educators in colleges of education can prepare students for the technological advancements that are currently shaping the automobile industry is the use of artificial intelligence in their instructional delivery. The term, Artificial Intelligence (AI) was coined by John McCarthy in 1955. AI is an information technology that has the capability to perform a variety of cognitive, affective and psychomotor tasks of humans. Artificial intelligence is the use of software algorithms and techniques to enable computers and machines to replicate human perception and decision-making processes in order to execute jobs successfully (Xia & Zheng, 2020). There are three types of artificial intelligence in terms of functionality and components (El-Halees & Aljamea, 2021) which includes Artificial Narrow Intelligence, Artificial General Intelligence (AGI) and Artificial General Intelligence (AGI).

Artificial Narrow Intelligence (ANI) is widely known as narrow or weak AI. It is the initial stage of artificial intelligence that focuses on only narrow tasks or one problem to relieve individuals from doing a monotonous job (Xia & Zheng, 2020). Tushar (2024) averred that Artificial General Intelligence (AGI) or strong AI that not only suppresses human intelligence and but also mimic the cognitive abilities of the human brain. Artificial

general intelligence (AGI) refers to AI that can learn, think, and do a variety of tasks comparable to humans. The main feature of strong AI is human-like, flexible thinking and reasoning (Siau, 2021). Super AI, often known as Artificial Super Intelligence (ASI), is the stuff of science fiction and the logical progression of AGI. It is predicted that if AI reaches the level of general intelligence, technologies become self-aware to learn quickly to the extent where its problem-solving skills and knowledge will surpass the capacity of humanity (Neha, 2023).

Currently, AI is making significant penetration and success in the healthcare, security, manufacturing, finance, energy, transportation and education sectors and many others. AI has been posited to have the ability to transform the classroom as it can improve teaching and learning, leading to smarter classrooms through personalized learning, improvement of learning assessment and reduction in workload for educators (Oladele, 2024). AI technologies provide a more individualized approach to education by analysing students' data and customizing learning experiences to meet their specific learning requirements. Teachers now have access to an increased number of tools and resources to identify students' learning styles, interests, and abilities and use this information to develop lessons tailored to each student's individual needs (Jamal, 2023). AI facilitates planning in teacher education saving time, creating better learning plans, providing essential technological support to instructors, and adjusting the time allotted for lessons to accommodate learners' needs (Köprülü, et al., 2023)

The utilisation of AI in automobile technology education can promote student's participation, reduce dropout rates and increase student's interest in studying the programme in colleges of education. According to Suleiman and Kamala (2024), AI offers creative teaching methods that can improve teaching and learning in Automobile Technology Education (ATE), where technical knowledge and practical skills are crucial. The manual processes of diagnosing, servicing and repairing automobiles are gradually being automated with artificial intelligence. It is not surprising that automobile maintenance and servicing companies are looking for graduates who understand and can apply artificial intelligence in carrying out predictive maintenance solutions, real-time analytics of faults, interpret algorithmic outputs, collaborate with robotic systems and respond quickly to sensor-driven signals embedded in hybrid and modern automobiles. Therefore, automobile technology education must be in tune with AI to produce automobile technology education graduates who can operate, maintain and troubleshoot different types of automobiles with AI-driven systems and AI enabled tools. The utilisation of AI-driven systems and AI enabled tools for teaching automobile technology education in colleges of education depends on the readiness of automobile technology educators.

Readiness refers to the extent to which individuals are prepared to do something. According to Karaca et al. (2021), readiness is defined as the degree to which an individual feels confident about oneself in disseminating AI education in elementary to high schools. To integrate AI into the classroom effectively, teachers need to be ready. Purnama et al. (2025) submitted that readiness describes the quality of person being able to meet a situation and carry out the required sequences of action after planning and training. In the context of this study, readiness is the willingness of automobile technology educators to utilise AI-driven systems and AI enabled tools such as predictive analytics technologies, voice assistant technologies, gesture recognition technologies, learning analytics technologies,

adaptive teaching technologies, intelligent content creation technologies, plagiarism detection technologies, automated grading technologies, augmented reality technologies, intelligent tutoring technologies and virtual reality technologies among others for instructional engagements in colleges of education. In addition, Neumann et al. (2024) posited that AI readiness refers to the capacity to implement and utilise AI technologies effectively through an approach that enhances its value.

Thus, educators' readiness is the starting point for the utilisation of AI in educational institutions. This implies that the effectiveness of AI in automobile technology education in colleges of education is strongly attached to the readiness of automobile technology educators to apply AI in their teaching. With adequate readiness, educators can confidently and effectively implement AI in education, fostering a more meaningful and efficient learning experience (Luan et al., 2020). Examining teacher readiness is critical to ensuring that AI adoption is successful and complements the learning process well (Luckin et al., 2022). This assertion means that utilisation of AI is impossible when educators are adequately ready to use AI for instructional processes. The majority of AI research focuses on AI technology literacy (Zawacki-Richter et al., 2019) as well as the use of AI in administration and improving student learning (Holmes et al., 2022), paying little attention to how teacher readiness affects AI utilisation, particularly in colleges of education in South East, Nigeria.

However, the extent of readiness to utilise AI among automobile technology educators is analyse based on the ownership of colleges of education and gender. In the context of this study, ownership refers to the institutional structure of colleges of education which can be owned and controlled by the federal and state governments. Gender in this study refers to male and female automobile technology educators in colleges of education. Therefore, the researchers are of the opinion that ownership and gender may influence automobile technology educators' readiness to facilitate smooth implementation of AI in colleges of education in South East, Nigeria. Against this background, the researchers explored the extent of readiness of automobile technology educators to utilise artificial intelligence in colleges of education in South East, Nigeria.

Statement of the Problem

For Nigeria's technical education programmes to be at par with global standard practices, Nigerian governments across all levels of governance must provide the necessary conditions for effective readiness among educators to use AI in various educational systems. Automobile technology educators often face readiness challenges that hinder effective AI utilisation in Nigerian colleges of education. Lack of enabling infrastructure, poor training opportunities and restricted access to technological resources are obstacles that draw attention to the differences in readiness among automobile technology educators, especially in colleges of education in South East, Nigeria. On this note, the problem of the study is posed as a question thus: what is the current extent of readiness of automobile technology educators to utilise AI in colleges of education in South East, Nigeria? Also, there is no prior study examining the current extent of readiness of automobile technology educators to utilise AI in colleges of education in South East, Nigeria. This is the crux of the study.

Research Question

1. What is the extent of readiness of automobile technology educators to utilise AI in colleges of education in South East, Nigeria?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance

1. Automobile technology educators in Federal and State colleges of education do not differ significantly in the mean ratings on the extent of readiness to utilise AI in colleges of education in South East, Nigeria
2. Male and female automobile technology educators in colleges of education do not differ significantly in the mean ratings on the extent of readiness to utilise AI in colleges of education in South East, Nigeria

METHODS

The study adopted descriptive survey research design. Descriptive survey research design makes it possible for the researchers to gather empirical information from automobile technology educators on their current level of readiness to utilise AI in colleges of education in South East, Nigeria. The population of the study comprised 27 automobile technology educators in three Federal colleges of education and 41 automobile technology educators in five State colleges of education in South East, Nigeria. The entire population was studied without sampling because the size was not too large. Therefore, it was a census survey. A structured questionnaire developed by the researcher titled 'Readiness and Utilisation of Artificial Intelligence for Teaching (RUAIT) consisting of 10 items, structured on a four-point rating scale of Very High Extent, High Extent, Moderate Extent, Low Extent and Very Low Extent was used for data collection. To ascertain the face validity of the questionnaire, it was validated by three experts, two senior Automobile Technology Education lecturers and one Educational Technology lecturer all in the University of Nigeria, Nsukka. To determine the internal consistency of the questionnaire, a one-shot pilot test was conducted at the Federal College of Education (Technical), Omoku on 10 Automobile Technology Education lecturers.

The data were subjected to statistical analysis using Cronbach's alpha formula and a reliability co-efficient of 0.79 was obtained. This is high enough for the instrument to be considered reliable as suggested by Nworgu (2015) that a reliability co-efficient of 0.70 and above is an acceptable reliability value. Copies of the questionnaire were administered to the respondents in their offices personally by the researchers with five research assistants. Out of the 68 copies of the questionnaire administered, only 61 copies (representing 90%) were successfully retrieved and used for data analysis. Mean and standard deviation were used to answer the research questions and determine the homogeneity or otherwise of the respondents' views. T-test was used to test the null hypothesis at 0.05 level of significance. A hypothesis was accepted where the p-value is greater than the alpha level of 0.05 ($p > 0.05$), at an appropriate degree of freedom; otherwise, the null hypothesis was rejected. Data collected was analysed using SPSS version 23.0.

RESEARCH RESULTS

Research Question 1

What is the extent of readiness of automobile technology educators to utilise AI in colleges of education in South East, Nigeria?

Table 1

Respondents' mean ratings on extent of readiness to utilise AI in colleges of education

S/N	Extent of readiness to utilise AI	$\overline{X}$	SD	Remarks
1	I feel confident using predictive analytics technologies to teach automobile technology courses	2.07	.56	Low Extent
2	I feel prepared using voice assistant technologies to teach automobile technology courses	3.22	.73	Moderate Extent
3	I can comfortably explain automobile technology concepts with gesture recognition technologies	2.84	.49	Moderate Extent
4	I am open to teach automobile technology courses with learning analytics technologies	1.93	.61	Low Extent
5	I can use adaptive teaching technologies to enhance students' understanding of automobile technology	2.15	.52	Low Extent
6	I feel confident using augmented reality technologies teach automobile technology courses	1.76	.80	Low Extent
7	I feel prepared using intelligent tutoring technologies to teach automobile technology courses	2.18	.67	Low Extent
8	I can comfortably explain automobile technology con with virtual reality technologies	1.99	.41	Low Extent
9	I can use automated grading technologies to expand students' learning experience in automobile technology	2.60	.79	Moderate Extent
10	I find it easy using plagiarism detection technologies to assess the assignments of automobile technology education students	3.01	.55	Moderate Extent

Data in Table 1 show that respondents have moderate extent of readiness on four items with mean scores ranging from 2.60 to 3.22 while they have low extent of readiness on the remaining six items with mean ratings ranging from 2.76 to 3.14. The cluster mean score of 2.38 indicates that automobile technology educators have low extent of readiness to utilise AI in colleges of education in South East, Nigeria. The standard deviations for the items are within the same range which shows that the respondents are homogeneous in their opinions.

Hypothesis 1

Automobile technology educators in Federal and State colleges of education do not differ significantly in the mean ratings on the extent of readiness to utilise AI in colleges of education in South East, Nigeria

Table 2

Summary of t-test analysis of respondents' mean ratings on extent of readiness to utilise AI in colleges of education based on institution ownership

Ownership	N	$\overline{x}$	SD	df	t-value	p-value	Decision
State COEs	39	35.95	4.55	59	.122	.105	Not Significant
Federal COEs	22	39.71	3.78				

Result in Table 2 shows that the p-value is 0.105, which is greater than the significance level of 0.05 (p-value > 0.05). This indicates that there is no significant difference in the mean ratings of automobile technology educators in Federal and State colleges of education on the extent of readiness to utilise AI in colleges of education in South East, Nigeria. The null hypothesis of no significant difference between the two groups is, therefore, not rejected.

Hypothesis 2

Male and female automobile technology educators in colleges of education do not differ significantly in the mean ratings on the extent of readiness to utilise AI in colleges of education in South East, Nigeria

Table 3

Summary of t-test analysis of respondents' mean ratings on extent of readiness to utilise AI in colleges of education based on gender

Gender	N	$\bar{x}$	SD	df	t-value	p-value	Decision
Male	41	59.31	5.84	59	.146	.139	Not Significant
Female	20	42.09	4.22				

Result in Table 3 shows that the p-value is 0.139, which is greater than the significance level of 0.05 (p-value > 0.05). This indicates that there is no significant difference in the mean ratings of male and female automobile technology educators on the extent of readiness to utilise AI in colleges of education in South East, Nigeria. The null hypothesis of no significant difference between the two groups is, therefore, not rejected.

DISCUSSION

The finding of the study showed that automobile technology educators have low extent of readiness to utilise AI in colleges of education in South East, Nigeria. This finding is in tandem with Köprülü et al., (2023) who reported that while educators may well be aware of the benefits of AI, they do not have a full understanding of how AI works which affect their readiness to use AI in the classroom. This finding agrees with Reuben and Kabilan (2024) who reported that educators in Nigeria's tertiary institutions are not quite ready to utilise AI technologies in their instructional practices due to limited access to necessary technology including computers, software and reliable internet. This is in line with Panagiotopoulos and Karanikola (2020) who professed that a lackadaisical readiness exists among teachers towards the use of AI due to increased workload and inequalities in the socio-economic gap to purchase AI technologies. The researchers believed that automobile technology educators are not adequately ready to utilise AI in their instructional activities because majority of them lack the required technical know-how for the integration of AI in academic settings. However, the study disagrees with Eke (2024) who reported Nigerian teacher educators have a high level of readiness towards the adoption of AI in educational settings. Perhaps, the different areas of study and research participants used may be responsible for the disparity of findings between the two studies.

Additionally, the study discovered no significant difference in the mean ratings of automobile technology educators on the extent of readiness to utilise AI in colleges of education in South East, Nigeria based on ownership type and gender. The non-significant difference in the mean ratings of automobile technology educators on the extent of readiness to utilise AI in colleges of education implies that ownership type and gender of automobile technology educators did not affect their opinions on this matter. Perhaps, both male and female automobile technology educators in Federal and State colleges of education need extensive training in AI to encourage their willingness to utilise AI in automobile technology education programme in colleges of education in South East, Nigeria. The researchers opined those male and female automobile technology educators in Federal and State colleges of education are not willing to utilise AI in the classroom due to absence of institutional support, which likely diminishes the urge to experiment with new teaching initiatives revolving around artificial intelligence. This finding supports, Makinde and Adeleke (2021) which reported that educators are not readily motivated to utilise AI because of the poor technological infrastructure in Nigerian academic environments. The finding of this study agrees with Onwuagboke (2023) reported that educators are not comfortable to use AI in their institutions as a result of mass

unawareness of the existence of AI technological tools and lack of professional development that can assist them to improve their AI skills for academic engagements with students.

Conclusion

Without doubt, AI will change the instructional designs of educators and learning dynamics of students if it is effectively utilised across all levels of learning. The study offers an insightful examination on the readiness levels of automobile technology educators in colleges of education in South East, Nigeria. Based on the findings of the study, the researchers concluded that there is a low extent of readiness among automobile technology educators to utilise AI in colleges of education in South East Nigeria because of the poor technological infrastructure, unavailability of AI devices and technology as well as insufficient digital training to merge AI with instructional procedures and students' engagements.

Recommendations

1. Management of colleges of education in South East Nigeria should create extensive digital programmes to increase the technological proficiency of automobile technology educators in order to facilitate their readiness to utilise AI for automobile technology education courses.
2. Government should arrange provide current AI devices, software packages and technologies in order to increase the awareness level of automobile technology educators to AI and organised practical conferences for them to know how to augment their instructional delivery with AI.
3. Curriculum developers of automobile technology education programme should review the curriculum with a view of incorporating contents of artificial intelligence technologies in the teaching and learning process of automobile technology education courses in colleges of education to foster digital learning experiences among automobile technology educators and students.

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