ARTIFICIAL INTELLIGENCE BASED PERSONALIZED LEARNING SYSTEMS AND SKILL ACQUISITION AMONG TECHNICAL COLLEGE STUDENTS IN EDO STATE

OSAKUE, D. O., & OGBEBOR, S.O. Ph.D
[1 & 2]Department of Vocational and Technical Education, Ambrose Alli University,
Ekpoma, Edo State, Nigeria
Email: [1]osakueosaruonamen@gmail.com; & [2]ogbeborsamuel23@gmail.com
Telephone: [1]08144522471; & 08078180039

Abstract
This study investigated AI-Based Personalized Learning Systems and Skill Acquisition among Technical College Students in Edo State using descriptive survey research design . The study was guided by two research questions and two hypotheses. The population comprised 1,341 students from the fiveEdo State-owned technical college during the 2025/2026 academic session. A sample size of 308 students was determined using the Taro Yamane formula and selected through stratified and simple random sampling techniques. The instrument used for data collection was titled Artificial Intelligence-Based Personalized Learning Systems and Skill Acquisition Questionnaire (AIPLSSAQ), developed by the researchers and validated by three experts in Technical and Vocational Education, Educational Technology, and Measurement and Evaluation. Mean and standard deviation were used to answer the research questions, while Pearson Product Moment Correlation (PPMC) was used to test the hypotheses at the .05 level of significance. The findings revealed that AI-based personalized learning systems were utilized to a high extent in technical colleges in Edo State with a Grand Mean of 2.74. The study also found that AI-based personalized learning systems positively influenced students' skill acquisition with a Grand Mean of 3.15. Furthermore, there was a significant positive relationship between AI-based personalized learning systems and skill acquisition among technical college students (r = .71 > .113). The study also revealed a significant relationship between the challenges of AI-based personalized learning systems and their utilization (r = .76 > .113). It was concluded that AI-based personalized learning systems significantly enhance skill acquisition, learning motivation, independent learning, and vocational competency development among technical college students. The study recommended, among others, that government should provide adequate funding and digital infrastructure, while technical college administrators and teachers should be trained and supported to effectively integrate AI technologies into teaching and learning processes Students should be encouraged to actively utilize AI-based learning tools for self-paced learning, problem-solving, and skill development in their various vocational fields.

Keywords: *Artificial Intelligence, Personalized Learning Systems, Skill Acquisition, Technical Colleges, Technical Vocational Education Training*.

Introduction

In Nigeria, technical colleges serve as the principal institutions for the implementation of TVET programmes at the secondary education level. Technical and Vocational Education and Training (TVET) is widely recognized as a critical component of national development due to its focus on equipping learners with practical skills, technical knowledge, and competencies required for employment, entrepreneurship, and lifelong learning. These institutions are specifically designed to prepare students for various occupational fields through a combination of theoretical instruction and hands-on training in trades such as building technology, electrical installation,

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mechanical engineering crafts, woodwork, and other vocational areas. The effectiveness of technical colleges in achieving their objectives depends largely on the quality of instruction, availability of learning resources, and the ability to address individual learning needs. As industries increasingly embrace digital transformation and technological innovation, there is a growing need for technical colleges to adopt emerging technologies such as Artificial Intelligence (AI) to enhance teaching and learning processes. Integrating AI-based personalized learning systems into TVET programmes could support skill acquisition by providing learners with customized learning experiences, adaptive instructional content, and continuous feedback that align with their vocational interests, abilities, and career aspirations.

Artificial Intelligence (AI) in education has created possibilities for personalized learning across the globe in different aspects of education. AI has helped to close educational gaps, reach diverse educational goals and further enhanced learning within and outside the school. With the advent of AI students have become more acquainted with personalized learning thereby exposing them to wider range of knowledge within their area of specialty. 'AI' facilitated personalized learning may refer to the use of technologies to design and deliver instruction that aligns with the distinct characteristics, level, and interests of individual learners. This is in contrast with the traditional model of education, aiming to enhance the learning experience by providing a routine pathway for every student. AI technologies provides feedback, suggest learning pathways based on learner performance, and offer personalized support, thereby enhancing student interest and motivation (Luckin et al., 2016). This approach ensures that learners receive content and activities that are appropriately aligned with their current level of understanding and interest, fostering a more efficient and effective learning process. In Edo State technical colleges, where resources are often limited, AI could possibly play a crucial role in optimizing existing educational inputs, and create new opportunities for students to acquire skills according to their interest.

There are lots of benefits for the integration of AI to enhance personalized learning and skill acquisition in Edo State Technical colleges. According to World Economic Forum (2023), AI-driven simulations improve hands-on learning experiences and help students acquire industry-relevant competencies. Technical colleges focus mainly on practical and vocational competencies, AI-powered simulations, virtual laboratories, and intelligent tutoring systems could allow students to practice technical skills repeatedly in safe and controlled environments before engaging in real-world applications. Moreover, AI-powered learning systems allows students to learn according to their own pace and ability levels, fast learners could progress quickly, while slower learners receive additional support and practice opportunities. This helps reduce learning gaps and ensures mastery of technical skills. AI can adapt instructional content to meet learners' specific needs, thereby improving learning outcomes and promoting inclusive education (UNESCO 2023). The integration of AI for personalized learning in Edo State Technical colleges, holds great promise for addressing some of the pressing challenges facing education and skill acquisition among students. By integrating AI, Technical educators could provide immediate feedback and assessment. AI systems provide real-time feedback on students' performance during practical and theoretical tasks. Immediate feedback may enable learners to identify mistakes quickly, quickly correct them, and ultimately improve their skills efficiently. Rose et al. (2016) indicated that AI-supported feedback enhances learners' understanding and accelerates skill development by providing timely interventions.

Despite the potential benefits of AI for personalized learning in technical colleges in Edo state, there are also several challenges that need to be addressed to ensure its successful implementation. One of the major challenges is resistance to change and technological adoption.

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Some educators, administrators, and even students may resist AI adoption due to fear of job displacement, uncertainty about new technologies, or preference for traditional teaching methods. Also, insufficient funding and high implementation costs stands out as another challenge to AI implementation. AI technologies may require substantial investment in hardware, software, maintenance, internet services, and technical support. Students Teachers, and even administrators in technical colleges operate with limited budgets and struggle to prioritize AI integration over basic educational needs. The high cost of acquiring and sustaining AI systems discourages widespread implementation in public technical institutions. Additionally, there is a need for capacity building among educators and administrators to effectively integrate and utilize AI technologies in their teaching practices.

Scientific research shows that AI personalized learning system, promotes skill acquisition among students and ultimately enhances academic achievement. Zawacki-Richter, et al (2019) conducted a systematic review of 146 studies on Artificial Intelligence applications in higher education. The study examined how AI technologies were being utilized to support teaching, learning, assessment, and learner support. Findings revealed that AI-powered personalized learning systems significantly improved learning outcomes by adapting instructional content to individual learner needs, monitoring student progress, and providing immediate feedback. The study further showed that AI enhances learner engagement and promotes self-directed learning. The researchers concluded that AI has substantial potential to transform educational delivery through personalized learning experiences. On the same note, Holmes, (2019) investigated the implications of Artificial Intelligence for teaching and learning across different educational settings. Using evidence from multiple educational institutions, the study examined how AI-supported adaptive learning systems influence learner performance and competency development. Findings indicated that students who utilized AI-based learning platforms demonstrated improved understanding of concepts, higher engagement levels, and better mastery of practical skills compared to students exposed to traditional instructional methods. The study concluded that AI-based personalized learning supports individualized instruction and enhances competency acquisition. George, et al (2022) examined the availability and utilization of digital technologies for TVET interactive learning in universities in South-East Nigeria using a descriptive survey of 150 TVET educators. It found that digital technologies were poorly available and underutilized, recommending increased provision of digital learning resources by government and institutions. The study adopted a descriptive survey design and involved TVET students and instructors from selected technical institutions. Findings revealed that technology-enhanced learning platforms positively influenced students' practical skill development, learning motivation, and academic performance. However, inadequate technological infrastructure, poor internet connectivity, and insufficient funding were identified as major constraints to technology integration. The study recommended increased investment in educational technologies and teacher training to improve skill acquisition outcomes.

Statement of the Problem

Concerns continue to be expressed regarding the quality of skill acquisition among technical college students in Nigeria, as many graduates still lack the practical competencies, technical proficiency, and employability skills required by modern industries and the labour market. This gap has been attributed to inadequate industry collaboration, obsolete training facilities, and insufficient practical exposure during training (Ogoina 2023). Despite these, Vocational education and Training is designed to equip learners with practical skills, technical

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competencies, and occupational knowledge required for gainful employment and self-reliance, and technical colleges serve as the primary institutions for delivering vocational education and training aimed at producing skilled manpower for national development (UNESCO, 2021).

One of the factors that could contribute to effective skill acquisition is the continued reliance on personalized learning system. Similarly, Luckin et al. (2016) observed that personalized learning supported by Artificial Intelligence (AI) can improve learner engagement, understanding, and performance through adaptive content delivery and continuous feedback. The emergence of AI-based personalized learning systems could offer significant opportunities for enhancing skill acquisition in technical education. These systems can analyze learners' performance, identify learning gaps, recommend individualized learning pathways, and provide real-time feedback that supports mastery of vocational skills (UNESCO, 2023). AI-powered simulations and virtual learning environments enable students to repeatedly practice technical skills in safe and controlled settings, thereby improving competency development and workplace readiness (World Economic Forum, 2023).

Several studies have examined the application of AI in education globally; there is limited empirical evidence regarding the influence of AI-based personalized learning systems on skill acquisition among technical college students in Edo State. This creates a knowledge gap that requires investigation. Therefore, there is a need to provide empirical evidence to examine the extent to which AI-based personalized learning systems contribute to skill acquisition among technical college students in Edo State and identify the challenges associated with their implementation. It is against this background that this study seeks to investigate AI-based personalized learning systems and skill acquisition among technical college students in Edo State.

Purpose of the Study

The general purpose of the study was to investigate AI-based personalized learning systems and skill acquisition among technical college students in Edo State. Specifically, the study sought to:

1. determine the extent to which AI-based personalized learning systems are utilized in technical colleges in Edo State.
2. examine the influence of AI-based personalized learning systems on skill acquisition among technical college students in Edo State.
3. examine the challenges in the adoption of AI-based learning systems among students at Technical Colleges in Edo State.

Research Questions

1. To what extent are AI-based personalized learning systems utilized in technical colleges in Edo State?
2. What is the influence of AI-based personalized learning systems on skill acquisition among technical college students in Edo State?

Research Hypothesis

1. There is no significant relationship between the utilization of AI-based personalized learning systems and skill acquisition among technical college students in Edo State.
2. There is no significant relationship between the challenges of AI-based personalized learning systems and their utilization among technical college students in Edo State.

Methods

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Descriptive survey research design was used to achieve the study's objectives. The population of the study covers all students in the five Edo State owned technical colleges of Edo State Government as at 2025/2026 academic session. Viz: Benin Technical College 800, Ehor Technical College, 93, Irrua Technical College, 205, Afuze Technical College, 118, Igarra Technical College, 125; giving a total of 1,341 students.

308 students were used as the sample for the study, it was determine using Taro Yamane (1967) formula for finite populations. Multi-stage sampling technique was employed for the study, firstly the colleges were stratified to ensure adequate representation from the five technical colleges, and thereafter simple random sampling technique was used to obtain students from the five State-owned technical colleges in Edo State.

The instrument used for data collection in this study was a structured questionnaire developed by the researcher titled Artificial Intelligence-Based Personalized Learning Systems and Skill Acquisition Questionnaire (AIPLSSAQ). The questionnaire was designed based research questions of the study to obtain information from technical college students on the utilization of AI-based personalized learning systems, their influence on skill acquisition, and the challenges associated with their adoption.

The questionnaire consisted of two sections (A and B). Section A sought information on the demographic characteristics of the respondents, including gender, age, class level, and area of specialization. Section B- Instrument on Extent of utilization of AI-based personalized learning systems contains a 4-point scale (Very High Extent VHE = 4, High Extent HE = 3, Low Extent LE = 2, and Very Low Extent VLE = 1), represent questions 1-9, Section C- Instrument on Influence of AI-based personalized learning systems on skill acquisition among technical college students contains a four-point Likert scale of Strongly Agree (SA = 4), Agree (A = 3), Disagree (D = 2), and Strongly Disagree (SD = 1) represent question 11-20, and Section D- represent instrument on Challenges in the adoption of AI-based personalized learning systems in technical colleges also contains a four-point scale of Strongly Agree (SA = 4), Agree (A = 3), Disagree (D = 2), and Strongly Disagree (SD = 1) represent questions 21-30.

The questionnaire was validated by three experts, two experts in Technical and Vocational Education, and one in Measurement and Evaluation from a Ambrose Alli University. The experts carefully examined the instrument to determine the relevance, clarity, adequacy and proper wording of the items in addressing the research questions of the study.

The Reliability of the instrument was determined by measuring the internal consistency. This was done by administering the instrument to 30 students from technical college in Asaba Delta State, who were not part of the study population. The data obtained from the respondents were subjected to Cronbach Alpha statistics. A reliability co-efficient of .76 was obtained.

The researchers with the assistance of research assistants personally administered copies of the questionnaire to the students in the five State-owned technical colleges in Edo state. Prior to this, permission was obtained from the principals of the respective colleges. The questionnaires were distributed directly to the students during school hours and collected immediately after completion to ensure a high rate of return and minimize loss of copies.

The data collected for this study were analyzed using descriptive and inferential statistics. Specifically, mean and standard deviation were used to answer the research questions. A mean score of 2.50 and above indicated agreement with an item, while a mean score below 2.50 indicated disagreement. While the research hypotheses were tested using Pearson Product Moment Correlation (PPMC) at the .05 level of significance.

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Results

Research Question 1: To what extent are AI-based personalized learning systems utilized in technical colleges in Edo State?

Table 1

***Mean Ratings on the Extent of Utilization of AI-Based Personalized Learning Systems in Technical Colleges in Edo State* (n = 308)**

S/N	Item Statement	Mean	SD	Remark
1	AI learning platforms are used for instructional delivery.	2.88	0.74	High Extent
2	Students use AI applications to support learning activities.	3.12	0.69	High Extent
3	AI tools provide personalized learning experiences.	2.95	0.81	High Extent
4	AI-based assessment tools are utilized.	2.41	0.77	Low Extent
5	AI-powered virtual simulations are used for practical training.	2.35	0.86	Low Extent
6	Students receive real-time feedback through AI systems	2.70	0.75	High Extent
7	AI platforms recommend learning resources.	2.83	0.72	High Extent
8	AI technologies support self-paced learning.	3.01	0.68	High Extent
9	AI learning systems are readily accessible to students.	2.45	0.79	Low Extent
	Grand Mean	2.74	0.76	High Extent

The data presented in Table 1 show the respondents' mean ratings on the extent of utilization of AI-based personalized learning systems in technical colleges in Edo State. The decision was based on the criterion mean, where mean scores above the benchmark indicate a high extent of utilization, while scores below the benchmark indicate a low extent of utilization. The results reveal that students perceived a high extent of utilization of several AI-based personalized learning practices. This suggests that although AI is being integrated into teaching and learning activities, advanced AI applications that require specialized infrastructure and resources are not yet widely adopted in the technical colleges. Therefore, AI-based personalized learning systems have gained considerable acceptance and usage among students and teachers in technical colleges in Edo State, although there remains a need to improve the availability and utilization of AI-based assessment tools, virtual simulations, and access to AI learning platforms.

Research Question 2: What is the influence of AI-based personalized learning systems on skill acquisition among technical college students in Edo State?

Table 2

***Mean Ratings on the Influence of AI-Based Personalized Learning Systems on Skill Acquisition* (n = 308)**

S/N	Item Statement	Mean	SD	Remark
1	AI improves practical skill development.	3.28	.63	Agree
2	AI enhances students' learning motivation.	3.16	.71	Agree
3	AI facilitates mastery of vocational skills.	3.21	.67	Agree
4	AI promotes independent learning.	3.14	.72	Agree
5	AI improves problem-solving abilities.	3.07	.74	Agree
6	AI enhances students' creativity.	2.95	.78	Agree
7	AI supports personalized learning pathways.	3.22	.64	Agree
8	AI improves retention of learned skills.	3.05	.76	Agree
9	AI helps students identify learning gaps.	3.18	.69	Agree
10	AI improves overall learning outcomes.	3.24	.66	Agree

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Grand Mean	3.15	.70	Agree

The data presented in Table 2 show respondents' mean ratings on the influence of AI-based personalized learning systems on skill acquisition among technical college students in Edo State. The criterion mean was used to determine the respondents' level of agreement with each item statement. The findings indicate that respondents agreed with all the items, suggesting that AI-based personalized learning systems have a positive influence on students' skill acquisition. Therefore, AI-based personalized learning systems exert a significant positive influence on skill acquisition, enhancing students' practical competencies, motivation, independent learning, problem-solving skills, and overall learning outcomes in technical colleges in Edo State.

Research Hypotheses

Hypothesis 1: There is no significant relationship between AI-based personalized learning systems and skill acquisition among technical college students in Edo State.

Table 3

Pearson Product Moment Correlation Analysis of the Relationship between AI-Based Personalized Learning Systems and Skill Acquisition **(n = 308)**

Variables	N	r- cal	r- critical	Decision
AI-Based Personalized Learning Systems and Skill Acquisition	308	.71	.113	Reject H_0

The result presented in Table 5 indicates that the calculated Pearson Product Moment Correlation coefficient (r = .71) is greater than the critical value (r = .113) at the .05 level of significance with 308 respondents. Since the calculated value exceeds the critical value, the null hypothesis (H_0) is rejected. This implies that there is a significant positive relationship between AI-based personalized learning systems and skill acquisition among technical college students in Edo State. The positive correlation coefficient of .71 indicates a strong relationship, suggesting that increased utilization of AI-based personalized learning systems is associated with higher levels of skill acquisition among students.

Hypothesis 2: There is no significant relationship between the challenges of AI-based personalized learning systems and their utilization among technical college students in Edo State.

Table 4

Pearson Product Moment Correlation Analysis of the Relationship between the Challenges of AI-Based Personalized Learning Systems and their Utilization among Technical College Students in Edo State **(n = 308)**

Variables	N	r- cal	r-critical	Decision
AI-Based Personalized Learning Systems and their utilization	308	.71	.113	Reject H_0

The result presented in Table 4 shows that the calculated Pearson Product Moment Correlation coefficient (r = .76) is greater than the critical value (r = .113) at the .05 level of significance with 308 respondents. Since the calculated value is higher than the critical value, the

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null hypothesis is rejected. This indicates that there is a significant relationship between the challenges of AI-based personalized learning systems and their utilization among technical college students in Edo State. Therefore, the challenges associated with AI-based personalized learning systems significantly influence their utilization in technical colleges.

Discussion of Findings

In respect to question one**,** the findings of the study revealed that AI-based personalized learning systems are utilized to a high extent in technical colleges in Edo State. It further revealed that AI applications are frequently used to support learning activities, facilitate self-paced learning, provide personalized learning experiences, and offer real-time feedback. However, the study also revealed low utilization of AI-powered virtual simulations, AI-based assessment tools, and accessibility to AI learning systems. This may be attributed to inadequate technological infrastructure, limited funding, poor internet connectivity, and insufficient availability of advanced AI facilities in technical colleges.

The finding aligns with the study of Holmes et al. (2019), who reported that AI-supported adaptive learning systems enhance instructional delivery by providing individualized learning opportunities that improve learner engagement and understanding. The result is also consistent with the findings of Zawacki-Richter et al. (2019), who observed that AI-powered learning platforms improve educational experiences through adaptive content delivery and personalized feedback mechanisms. This finding also corroborates Akinola and Onabamiro (2022), who identified inadequate technological infrastructure and insufficient funding as major barriers to technology integration in TVET institutions.

In research question 2, findings revealed that AI-based personalized learning systems positively influence skill acquisition among technical college students in Edo State, as respondents agreed that AI improves practical skill development, enhances learning motivation, facilitates mastery of vocational skills, promotes independent learning, improves problem-solving abilities, and supports personalized learning pathways.

This finding agrees with the report of the World Economic Forum (2023), which noted that AI-driven learning environments and simulations improve practical skill acquisition and workplace readiness among learners. The result also supports the findings of Zawacki-Richter et al. (2019), who established that AI-based personalized learning systems significantly improve learning outcomes through adaptive instruction and immediate feedback. Similarly, Holmes et al. (2019) found that students exposed to AI-supported learning environments demonstrated greater mastery of concepts and practical competencies than those taught through traditional methods. The study suggests that AI technologies can effectively bridge learning gaps, accommodate learners' individual differences, and improve the quality of vocational education by promoting competency-based learning.

The result of hypothesis one revealed a significant positive relationship between AI-based personalized learning systems and skill acquisition among technical college students in Edo State The null hypothesis was rejected, indicating that increased utilization of AI-based personalized learning systems is associated with higher levels of skill acquisition. This finding supports the theoretical assumption that personalized learning technologies improve learners' performance by adapting educational content to individual needs and providing continuous feedback. The result agrees with Holmes et al. (2019), who reported that AI-based learning systems significantly enhance competency acquisition and learner performance. It also aligns with UNESCO (2023), which emphasized that AI can improve learning outcomes by personalizing instruction and promoting mastery learning.

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The result of hypothesis 2 revealed a significant relationship between the challenges of AI-based personalized learning systems and their utilization among technical college students in Edo State. This result implies that challenges such as inadequate funding, poor technological infrastructure, insufficient internet connectivity, lack of technical support, and resistance to technological change significantly affect the utilization of AI-based personalized learning systems. The finding is in support with the study of Oyekunle et al. (2024), who found that inadequate ICT infrastructure, unreliable electricity supply, insufficient funding, and limited access to digital facilities continue to hinder the effective integration of digital technologies in Technical and Vocational Education (TVET) institutions in Nigeria. The finding also agrees with UNESCO (2023), which identified inadequate digital infrastructure and capacity-building challenges as key barriers to AI adoption in education. The authors concluded that without sustained investment in modern technological infrastructure and institutional funding, the adoption of digital teaching and learning innovations in TVET will remain limited, thereby affecting students' practical skill acquisition and workforce preparedness.

Conclusion and Recommendations

Based on the findings of this study, it was concluded that AI-based personalized learning systems are utilized to a considerable extent in technical colleges in Edo State and have a significant positive influence on students' skill acquisition. The study established that AI technologies enhance practical skill development, improve learning motivation, support independent learning, and promote mastery of vocational competencies among students. The study also revealed a strong positive relationship between AI-based personalized learning systems and skill acquisition, indicating that increased utilization of AI technologies contributes significantly to improved vocational learning outcomes. However, the effective utilization of AI-based personalized learning systems is hindered by several challenges, including inadequate infrastructure, poor internet connectivity, insufficient funding, and limited access to advanced AI tools. Therefore, AI-based personalized learning systems possess great potential for improving the quality of Technical and Vocational Education and Training (TVET) in Edo State, provided that the identified challenges are adequately addressed.

Based on the findings and conclusions of this study, the following recommendations were made:

1. Government should provide adequate funding for technical colleges to acquire AI-based learning technologies, internet facilities, computers, and other digital infrastructure necessary for effective implementation.
2. Technical college administrators should promote the integration of AI technologies into teaching and learning activities by providing adequate institutional support and creating enabling environments for technology adoption.
3. Teachers and instructors should receive regular training and professional development programmes on the effective use of AI-based personalized learning systems to enhance instructional delivery and skill acquisition.
4. AI-powered virtual laboratories and simulation technologies should be introduced in technical colleges to provide students with opportunities for practical learning experiences in safe and controlled environments.

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5. Internet connectivity should be improved across technical colleges in Edo State to facilitate seamless access to AI learning platforms and digital educational resources.

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