ARTIFICIAL INTELLIGENCE AND SERVICE DELIVERY IN TVET INSTITUTIONS IN OYO STATE

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Abstract

Despite the tremendous potentials of artificial intelligence in improving service delivery, little study has been undertaken on the particular effects of these technologies on students' learning experiences in the context of Nigeria's Technical and Vocational Education and Training (TVET) institutions. This rationale informed the decision to carry out a research that examines the connection between artificial intelligence and service delivery in TVET institutions. A survey design was adopted for this study and it comprised final year students of Federal School of Survey, Oyo State with a total of four hundred and thirty-two (432) students. A sample size of two-hundred and eight (208) was derived using Taro Yamane sample determination formula. Structured questionnaire was used in collecting the data needed to make a deduction. The collected data were analysed using multiple regression to test the hypotheses. The findings of the study revealed that Virtual Library Software has a significant effect on students' learning experience in the study area (β =0.3224; t=2.2926; p<0.05). Also, the result of the findings further showed that AI writing tools have a significant effect on students' learning experience in the study area (β =0.3013; t=2.1872; p<0.05). The study concludes that artificial intelligence has a significant effect on service delivery in the study area. The study therefore recommends the infusion of artificial intelligence tools such as virtual library application and writing tools in service delivery of TVET institutions to improve students' learning experience.

Keywords: Artificial intelligence; Learning experience; Service delivery; TVET.

Introduction

Institutions of Technical and Vocational Education and Training (TVET) play a critical role in providing individuals with the skills and knowledge needed for gainful employment and economic growth (Wang & Liu, 2021). The fast growth of Artificial Intelligence (AI) technology in recent years has prompted interest in their potential applications across a variety of industries, including education (Alam & Hossain, 2021). AI, a subfield of computer science, refers to algorithms and machines that can simulate human intellect and decision-making processes (Lee, Kim & Park, 2020).

As AI technologies advance, there is a rising interest in determining how they may be used to improve service delivery at TVET institutions. Several studies have been conducted throughout the world to investigate the application of AI in education, demonstrating its potential to personalise learning, optimise administrative operations, and enhance overall educational outcomes. AI-driven curriculum creation can meet students' specific learning demands, whilst AI-based teaching and assessment technologies provide real-time feedback and adaptable learning experiences (Koh & Yeo, 2020). Furthermore, AI systems can automate administrative work, freeing up educators' time to focus on educational activities (Smith, Johnson & Brown, 2018). However, using AI in educational contexts is fraught with challenges. Concerns about data privacy, ethics, and the possible replacement of human instructors remain (Rahimi & Van Den Akker, 2021). Furthermore, physical and resource restrictions may impede the successful integration of AI technology in Nigerian TVET institutions (Yang & Wu, 2021).

Virtual library software provides a dynamic and interactive platform via which students may access a wide range of digital resources such as e-books, journals, multimedia material, and databases (Trigwell & Prosser, 2019). This technology overcomes the limits of conventional physical libraries, allowing students to access information from anywhere at any time (Kumar & Bhanot, 2021). Virtual libraries strive to promote autonomous and self-directed learning by allowing students to investigate topics outside of the classroom (Kim & Lee, 2021).

Artificial intelligence writing tools, on the other hand, use natural language processing algorithms to aid students with diverse writing assignments (Hicks & Song, 2020). These programmes can give grammatical and spelling

corrections, help with sentence structure, and provide real-time feedback on writing quality (Hicks & Song, 2020). AI writing tools have the ability to improve students' writing abilities, raise their confidence, and improve the writing process as a whole (Molla & Licker, 2018).

Despite their tremendous potential, little study has been undertaken on the particular effects of these technologies on students' learning experiences in Technical and Vocational Education and Training (TVET) institutions in Oyo State, Nigeria. The purpose of this study is to look at the effects of AI on service delivery in TVET institutions in Federal School of Survey, Oyo State, Nigeria. The study will provide useful information for policymakers and educators looking to utilise AI's potential to improve educational quality and institutional efficiency by investigating students' views, experiences, and attitudes towards AI integration.

The study objectives were looked at in the following areas:

i.   To evaluate the effect of virtual library software on students' learning experience.

ii.   To investigate the effects of artificial intelligence (AI) writing tools on students' learning experience.

Literature Review

Technical and Vocational Education and Training (TVET) is a type of education that focuses on providing students with the practical skills and information required for certain trades, professions, or vocations (Ali, 2019). TVET programmes combine academic and practical learning to prepare students for the labour market or additional study in a specific subject (Alam & Hossain, 2021). TVET is critical in meeting worker demands, lowering unemployment, and promoting economic growth (Alam & Hossain, 2021). It promotes a skilled workforce capable of adapting to changing industries by offering a variety of career opportunities (Sahin & Ozgur, 2021). TVET graduates are job-ready due to the emphasis on practical application, making them valuable assets in the labour market (Ali, 2019). This sort of education enhances academic learning and bridges the gap between school and industry.

Virtual library software refers to digital platforms and apps that allow users to access a variety of electronic materials, such as e-books, journals, databases, and multimedia content (Yang & Wu, 2021). Virtual library software, as opposed to traditional physical libraries, allows users to access and utilise these resources remotely via internet-connected devices (Koh & Yeo, 2020). The programme enables smooth navigation and search functions, allowing users to explore a variety of themes, do research, and obtain information on-demand (Sahin & Ozgur, 2021). Virtual library software provides several benefits to both students and instructors. It encourages self-directed and autonomous learning, allowing students to investigate issues outside of the classroom and traditional curriculum (Rahimi & Van Den Akker, 2021). This easy access to a wide range of digital materials improves the learning experience and encourages critical thinking and information literacy abilities (Kumar & Bhanot, 2021). Educators may also use virtual library software to create dynamic and interactive learning experiences (Ali, 2019). They can select resources that are connected with specific learning objectives, personalise reading lists, and offer extra materials to accommodate different learning styles and interests (Sahin & Ozgur, 2021). The analytics features of the programme allow instructors to track students' engagement and development, allowing for data-driven educational decisions (Beck, 2019).

Artificial intelligence writing tools are software programmes that use artificial intelligence and natural language processing techniques to aid users with various writing activities (Koh & Yeo, 2020). Grammar and spelling suggestions, sentence rearrangement, and real-time feedback on writing quality are all elements of these products (Hicks & Song, 2020). The goal of artificial intelligence writing tools is to improve writing fluency, accuracy, and overall writing ability (Hicks & Song, 2020). These tools give personalised recommendations by analysing the context and structure of the text, assisting users in refining their writing abilities and producing more polished and cohesive material (Beck, 2019). AI writing tools have grown in popularity in educational settings because they help students with academic writing problems and enable them to become more confident and skilled writers (Yang & Wu, 2021). Furthermore, these technologies may be used in a variety of vocations to expedite and improve textual communication (Yang & Wu, 2021).

The process of offering and fulfilling services in order to meet the requirements and expectations of consumers or clients is referred to as service delivery (Hicks & Song, 2020). It includes all activities involved in providing a service, from the initial contact to the ultimate output (Ali, 2019). Service delivery is critical in a variety of industries,

including education, healthcare, and public administration, where the quality and efficacy of services directly affect customer satisfaction and overall outcomes (Kim & Lee, 2021). Effective service delivery necessitates a client-centric strategy, recognising and anticipating consumer expectations, and assuring timely and efficient delivery (Kim & Lee, 2021). In today's digital era, technology plays a crucial role in optimising service delivery processes, allowing organisations to improve accessibility, personalisation, and efficiency in satisfying consumer requests (Molla & Licker, 2018). Continuous improvement and innovation are required to ensure high-quality service delivery and client loyalty (Trigwell & Prosser, 2019).

The holistic and diverse process of acquiring information, abilities, and attitudes through educational activities within an academic context is referred to as the student learning experience (Demir & Uzuntiryaki-Kondakci, 2021). It includes student interactions, involvement, and perspectives throughout their learning experience. A favourable and rewarding learning experience encourages active involvement, critical thinking, and ownership of the learning process (Trigwell & Prosser, 2019). Quality of instruction, curriculum design, learning materials, and the learning environment all have a substantial impact on students' learning experiences (Demir & Uzuntiryaki-Kondakci, 2021). Furthermore, the incorporation of technology, interactive learning approaches, and opportunities for hands-on experiences all lead to a better learning experience overall (Yang & Wu, 2021). Educational institutions may improve student motivation, contentment, and, eventually, academic performance by continuously reviewing and enhancing the learning experience.

The Technology Acceptance Model (TAM) is one relevant and supportive theory for examining the influence of artificial intelligence on service delivery in TVET institutions. Davis established TAM in 1989 to explain the elements that influence people's acceptance and adoption of new technology. TAM considers perceived utility (PU) and perceived ease of use (PEOU) to be important factors of technology adoption (Davis, 1989). TAM can assist in examining students' and instructors' attitudes towards AI technology in the context of AI integration in TVET institutions. Students are more inclined to adopt AI writing tools and virtual library software if they believe they would improve their learning experiences (Yang & Wu, 2021). Similarly, if educators find AI technologies simple to utilise in their teaching and administrative activities, they are more likely to incorporate them into their pedagogical practises (Alam & Hossain, 2021). TAM can help analyse students' and instructors' attitudes towards AI technology in the context of AI integration in TVET schools. Students are more likely to use AI writing tools and virtual library software if they feel it would improve their learning experiences (Yang & Wu, 2021). Similarly, if educators find AI technologies easy to use in their teaching and administrative operations, they are more inclined to adopt them into their pedagogical practises (Alam & Hossain, 2021).

Lee et al. (2020) investigated the use of AI-driven customer service in a retail scenario. According to the research, AI-powered chatbots and virtual assistants enhance response times and manage client questions more effectively than human representatives. Customers expressed increased levels of satisfaction as a result of faster problem resolution and personalised interactions.

Chen et al. (2019) studied the use of AI technology in the delivery of healthcare services. AI-powered diagnostic technologies and predictive analytics have shown to be extremely accurate in terms of early illness identification and patient prognosis. According to the report, AI-enabled telemedicine solutions offer remote patient monitoring, improving access to healthcare services and decreasing the strain on medical institutions.

Wang and Liu (2021) investigated the effects of AI integration on educational service delivery. AI-powered personalised learning systems improve student engagement and academic success. Virtual tutors and artificial intelligence writing tools assist students in their learning journeys, enhancing writing skills and overall academic accomplishment.

Smith et al. (2018) investigate the influence of artificial intelligence (AI) technology on government service delivery in smart cities. Data analytics powered by AI and smart technologies optimise resource allocation, traffic management, and public services. The study shows that incorporating AI into smart city efforts improves efficiency, sustainability, and public happiness.

Conceptual Framework

This study is carried out to investigate the effect of artificial intelligence on service delivery in TVET institutions in Oyo State. Artificial intelligence is proxied using virtual library software and AI writing tools while service delivery
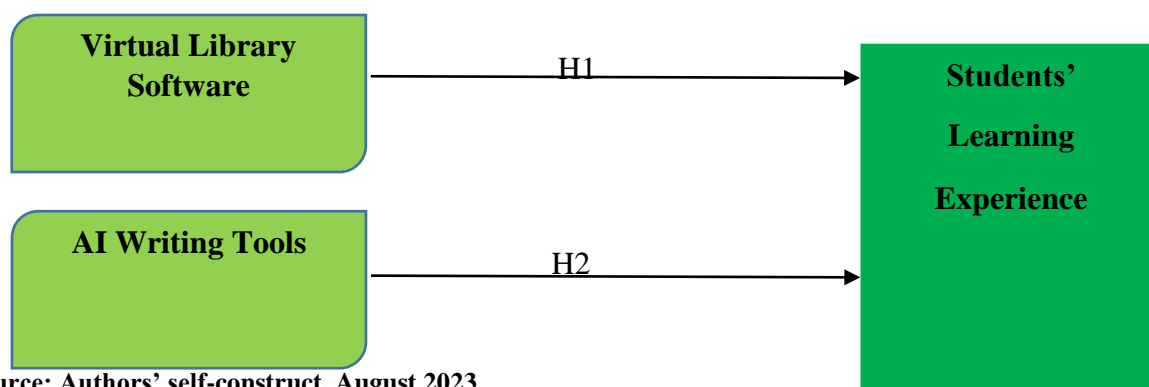
is proxied using students learning experience. This conceptual framework is depicted in the conceptual model in figure 1 below:

Fig. 1: Conceptual model

IV: Artificial Intelligence   **DV: Service Delivery**

Source: Authors' self-construct, August 2023

Methodology

The chosen philosophy for this research is positivist. A deductive approach was utilized for this study. Additionally, the research design for this study took the approach of a survey. The population of the study comprises final year students of Federal School of survey, Oyo State, Nigeria with a total of four hundred and thirty-two (432) in all (Registrar Office, 2023). Utilizing Taro Yamane sample size determination formula and taking a 5% margin of error into confidence, a total of two-hundred and eight (208) was determined as the sample size for the study. To gather the data used for making deduction, the researchers adopted a structured questionnaire that was designed using google form software. The research instrument (questionnaire) was validated using content and construct validity. The reliability was achieved using Cronbach alpha test. In administering the questionnaire, a link was generated from google form and this link was sent to the study participants via whatsapp. The collected data were analysed using inferential statistics. Specifically, the hypotheses were tested using multiple regression analysis with the aid of SPSS version 23.

Results

Table 1: Model Summary

Regression Statistics	
Multiple R	0.308425581
R Square	0.095126339
Adjusted R Square	0.077028866
Standard Error	0.571663015
Observations	52

Source: Field Survey, August 2023

The model overview of the analysis performed on the variables is shown in table 1. The adjusted R^2 value of 0.077 indicates that both virtual library software and AI writing tools account for approximately 77% of the variation in

students' learning experience in the study area. The remaining 23% is due to factors that were not included in the model. Furthermore, the standard value of 0.5716 indicates that the model is adequate in predicting the association between the variables studied in this study.

Table 2: ANOVA

	df	SS	MS	F	Significance F
Regression	1	1.717762156	1.717762156	5.256332617	0.026110508
Residual	50	16.33993015	0.326798603		
Total	51	18.05769231			

Source: Field Survey, August 2023

Table 2 displays the results of the analysis of variance (ANOVA), which is a method for analysing the amount of change in the dependent variable caused by the independent variables. The F-statistics value of 5.2563 indicates that a unit increase in the independent variables, i.e. virtual library software and AI writing tools results in an increase in students' learning experience by 5.2563 units. Furthermore, the p-value of 0.0261 is less than the acceptable level of significance (0.05 or 5%), implying that the independent variables (virtual library software and AI writing tools) have positive and significant effect on students' learning experience in the study area, when combined.

Table 3: Coefficient

	Coefficients	Standard Error	t Stat	P-value
Intercept	1.7974	0.3736	4.8103	1.42593
Virtual Library	0.3224	0.1406	2.2926	0.02611
AI Writing tools	0.3013	0.1301	2.1872	0.01231

Dependent Variable: Students' Learning Experience

Source: Field Survey, August 2023

The information displayed in table 3 is the individual relationship between the independent variables and the dependent variable. The results of Virtual Library Software (β =0.3224; t=2.2926; p<0.05) implies that a unit increase in virtual library software will result in 2.2926 unit increase in students' learning experience in the study area. Also, the p-value is less than the acceptable 5% level of significance, which implies that virtual library software has a significant effect on students' learning experience in the study area.

Furthermore, the results of AI writing tools (β =0.3013; t=2.1872; p<0.05) implies that a unit increase in virtual library software will result in 2.1872 unit increase in students' learning experience in the study area. Also, the p-value is less than the acceptable 5% level of significance, which implies that AI writing tools has a significant effect on students' learning experience in the study area.

Test of Hypotheses

Decision Criteria: accept the null hypothesis (H0) if p>0.05 and reject the alternative (H1). However, if p<0.05, reject the null hypothesis (H0) and accept the alternative (H1).

Hypothesis One:

H0: Virtual Library Software does not have a significant effect on Student's Learning Experience

Decision: Based on the result in table 3, the p-value of virtual library software is less than the acceptable level of significance. Hence, the study rejects the null hypothesis (H0) and accepts the alternative (H1). Thus, the study concludes that virtual library software has a significant effect on students' learning experience in the study area.

Hypothesis Two:

H0: AI writing tools does not have a significant effect on Student's Learning Experience

Decision: Based on the result in table 3, the p-value of AI writing tools is less than the acceptable level of significance. Hence, the study rejects the null hypothesis (H0) and accepts the alternative (H1). Thus, the study concludes that AI writing tools has a significant effect on students' learning experience in the study area.

Discussion

The outcome of the survey revealed that in the study area, the learning experience of the respondents (the students) is significantly impact by the incidence of virtual library software and AI writing tools. This is an indication that the presence of virtual library software gives the students the opportunity to enhance their knowledge, thereby improving their learning experience. As a result, it can be said that TVET institutions need to integrate virtual library software into their process and also encourage the students to make use of it.

Similarly, the findings that shows that AI writing tools positively impact on the learning experience of the respondents is an indication that the learners find it more easier and helpful using artificial intelligence writing tools to improve their learning experience. As a result of this findings, it becomes crucial for TVET institutions to look at the opportunities presented by artificial intelligence writing tools in improving the learning experience of their students. Furthermore, these writing tools may help instructors develop more knowledge about complex subject areas. However, the usage and popularization of AI writing tools must be threaded with caution due to certain side effects. For example, over-reliance on AI writing tools may erode learners and instructors of originality of piece of work put together. Moreso, over-reliance on AI writing tools may lead to a situation whereby the user may have little or no input in their own assignments, dissertations or articles.

Conclusion

The findings of this study points out that virtual library software and AI writing tools have significant effects on students' learning experience in Federal School of Survey, Oyo State. Based on this findings and in line with the ANOVA result in table 2, the study reaches a conclusion that artificial intelligence has significant effect on service delivery in TVET institutions in Federal School of Survey, Oyo State. This findings is in line with the findings of Wang and Liu (2021); Smith et al. (2018) who assert that virtual tutors and artificial intelligence writing tools assist students in their learning journeys, enhancing writing skills and overall academic accomplishment.

In light of the findings, the study recommends the following:

To improve students' learning experiences, management of TVET institutions need to make virtual library software and AI writing tools available to all students. TVET institutions should give enough access to laptops, tablets, and other internet-connected devices. Furthermore, ensure that the software and tools are user-friendly, allowing students to explore and use them successfully without considerable technical obstacles.

Secondly, there is a need to provide thorough training and continuing support for virtual library software and AI writing tools to students and instructors. To familiarise people with the functionality and benefits of these technologies, hold workshops, tutorials, and demos. Educators should be trained in incorporating AI writing tools into writing education and advising students on how to use the software to enhance their writing abilities.

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