CAPACITY BUILDING AS PANACEA TO SMES PERFORMANCE IN LAGOS STATE, NIGERIA

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ABSTRACT

The study examined capacity building as a panacea to SMEs performance in Lagos State Nigeria. Two research questions and two hypotheses guided the study. A descriptive survey of correlational design was used in this study. The population of the study comprised all SMEs in Lagos state Nigeria. As a result of the large coverage area of Lagos state, the study was conducted in Alimosho local government area selected using purposive sampling technique. Using simple random sampling technique, a total of 52 SMEs were selected in this local government. Researcher developed an instrument titled: Capacity Building and SMEs Performance Questionnaire (CBSMEPQ) was used for data collection with reliability coefficient (r = .94). Research questions were answered using PPMC and hypotheses tested using multiple regression analysis. The findings revealed that there was a relationship between business training (r = 0.682, p <.05); ICT training (r = 0.320, p <.05) and SMEs performance. There were significant composite contributions of the business and ICT trainings on the SMEs performance; R = 0.701, p < .05, and that about 48% of the variance in SMEs performance was accounted for by the linear combination of the independent variables. The two explanatory variables examined were found to be relatively significant and strongly determine SMEs performance with their P-value less than 0.05. Sign of Business training (β = .559, t = 7.467, p <.05) and ICT training (β = .546, t = 4.659). It was recommended that SMEDAN as a matter of urgency should raise their bar on developing scheme of training exercises on new digital innovations that can be adopted by SMEs on effective participation in global economies.

Keywords: **Capacity Building, Business Training, ICT Training, SMEs Performance.**

Introduction

Small and medium scale enterprises (SMEs) role in any economies, most especially in developing nations cannot be

overemphasizing. Its role is very diverse in terms of employment generation, poverty reduction, wealth creation, improvement in local raw materials utilization, increases in tax revenue of the government among other benefits of SMEs. SMEs directly supply the raw materials to large firms for further production in order to ensure supply-chain and continuous production to the economy. However, SMEs performance entails the ability to continues to make profits and expand business activities towards sustainability of the firm. SMEs performance could be measure in terms of increases in numbers of employees, expansion in the businesses, liquidity at hand and profit margin compare with the previous accounting year. This SMEs performance play germane role in the economic and business development of the nation. Performance in terms of efficiency at work-concerns, customers' satisfaction with the products and services, value of market share, as well as the size of the production activities. It can also be said that SMEs performance can be determine through ability of the firm to maintain and sustain high revenues in form of profits, increases in the numbers of acquired assets and consistent attempt to employees.

For instance, in the most populous country in African, Nigeria precisely, SMEs have been playing prominent role for the local production of goods and services most especially around Agriculture and others. Kithae and Keino (2016) said no country ever develops and experiences growth without the high performance of SMEs sector and that this sector is germane towards economic development. Nwapi (2023) believes that the performance of SMEs in the long term could translate towards the attainment of sustainability and in short, this can give the enterprise access to formal economy and consequently promoting general economic activities of the country.

Ikupolati, Medubi, Obafunmi, Adeyeye and Oni (2017) opine that SMEs is an important business activity in any country, because no nation can exist without any forms of businesses activities local or globally and they further stated that the performance of these enterprises might be influencing by some factors. That is, the training and knowledge acquired by the owners and staff of the enterprises mostly matter in success and performance. Been into one business and looking ahead to achieve profits and expansion required some knowledge and skills that may not be visible to attain on-the job seeking for external training inform of capacity building. Eyanuku (2022) pinpoint that in this global-age of business transformation, the whole word is now in a village and that businesses who desire for better performance need to improve their knowledge, skills and competencies on the new ways of doing business and that such enterprises should be looking ahead to capacity building development that can suit their business strategy for performance. Capacity building is a process of acquiring more skills, knowledge and experts in way of conducting business especially in problematic situations. The rapid changes in ways of conducting business in today's environment have prompted the need for change and improvement in the level of SMEs which could be attain through capacity training indicators such as training, information and communication technology (ICT) training, workshop, among others.

According to Ikupolati et al (2017), capacity building for SMEs entails the engagement steps of equipping and preparing them with contemporary skills and ways they can have access to Germane data, capability and required training that can improve their ability to out-perform in the field of business endeavours. Aladejebi (2018) lamented that although, SMEs performance is required factors for sustainable economic development as their training inform of capacity building is also Germane. The author argued that SMEs capacity building can be seen as a process of acquiring education and training with the aim of developing needed skills and competencies for performance in business. Capacity building such as business training, ICT and workshop are three major programmes SMEs can attend towards informing their skills and knowledge in today business world to compete vividly.

Business training according to Nwapi (2023) is an engagement process SMEs attends to facilitate development of

acquiring knew skills in business for optimal performance on the job. In short, this training exercise comprises attributes that can enhance enterprises adapt to needed contemporary skills and may also inform new knowledge on how to handle and utilize digital tools for business performance. This kind of training have been found to enhance SMEs achieve specific standards of proficiency; adapt to usage of modern technologies, tools and techniques and engage employee to directly contribute towards goal achievement of the firm (Mohammed & Sharma, 2020). Romanus and Dickson (2024) believed that ICT training are needed for business in today world because businesses activities are more done better through the use of ICT tools and is more germane for any SMEs to join the league of online business development which can be made possible through adaptation of ICT knowledge. Thus, ICT training needed by SMEs for optimal business performance entails how to effectively be utilized digital tools, networks and software; use digital tools for communication, creation, storage, and information management and use technology to solve business problems related to information and communication.

Statement of the Problem

Considering the role of SMEs in economic development through the job creation, poverty reduction and standard of living, their performance have not been fruitful in Nigeria economy. Many of them have been reported failure and liquidation. Even observations have indicated that most SMEs don't wait to witness their fifth years of businesses before liquidation in Nigeria. The indirect effect of this liquidation is that there will be high unemployment, high poverty rate, poor standard of living as well as insecurity of life and property will flow the economies. Although, many factors have been reported to cause this ugly circumstance in Nigeria. Factors such as government multiple taxation systems, poor infrastructural development, high interest rate charged by banks, insecurity, massive inflow of foreign goods and services among others. Despite steps taken so far by the government in establishing Bank of Industry to stimulate SMEs growth and performance, their liquidation persisted. This study was an attempt to examined capacity building as panacea to SMEs performance in Lagos State Nigeria to provide empirical data that will inform objective intervention by relevant stakeholders

Purpose of the study

The main objective of the study was to examine capacity building as panacea to SMEs performance in Lagos State Nigeria. Specifically, the study sought to:

1. find out the relationship between business training and SMEs performance in Lagos State.
2. ascertain the relationship between ICT training and SMEs performance in Lagos State.
3. determine the composite contributions of capacity building (business and ICT trainings) on SMEs performance in Lagos State.
4. examine the relative influence of capacity building (business and ICT trainings) on SMEs' performance in Lagos State.

Research Questions

1. Is there any relationship between business training and SMEs' performance in Lagos State?
2. What is the relationship between ICT training and SMEs' performance in Lagos State?

Research Hypothesis

$H_0$1: There is no significant composite contributions of capacity building (business and ICT trainings) on SMEs performance in Lagos State.

$H_0$2: There is no significant relative influence on capacity building (business and ICT trainings) on SMEs performance in Lagos State.

Methodology

A descriptive survey of correlational design was used in this study. This design helps the study to establish the relationship between capacity building (business and ICT trainings) on SMEs performance. The population of the study comprised all SMEs in Lagos state Nigeria. As a result, the large coverage area of Lagos state, the study was conducted in Alimosho local government area. This local government was selected using a purposive sampling technique because it is the larger local government in the state. Using a simple random sampling technique, a total of 52 SMEs were selected in this local government. This sampling technique was to ensure that all the SMEs in the area have equal chances of been included in the sample size. Self-researcher developed an instrument titled: Capacity Building and SMEs Performance Questionnaire (CBSMEPQ) was used for data collection. This questionnaire was divided into three parts such as section 1, 2, and 3. Part 1 focused on the demographic characteristics of the respondents, parts 2 and 3 comprised items regarding items on business and SMEs performance, respectively.

The questionnaire was subjected to validation by three experts from Olabisi Onabanjo University, Department of Business Administration and Tai Solarin University of Education, Department of Test and Measurement. All the issues raised were amended before testing for the reliability of the instrument. A total of 10 SMEs in Abeokuta South local government in Ogun State were used as testing ground for reliability exercises. The data collected from the exercises were subjected to Cronbach alpha formula and a reliability coefficient of (r = 0.94) was reported. The researcher and 3 research assistants participated in the process of administration of the instrument. The research assistants helped the researcher in distributing the questionnaires to the respondents and after three weeks, copies were retrieved. Unfortunately, only 49 copies were retrieved out of 52 copies. Retrieval rate was 94% and used for analyses. Research questions were answered using Pearson Product Moment Correlation (PPMC) and hypotheses tested using multiple regression analysis.

Results

Research Question 1: Is there any relationship between business training and SMEs performance in Lagos State?

Table 1: Relationship between business training and SMEs performance in Lagos State

Variables	Mean	SD	r-value	df	p-value	Remark
SMEs performance	31.9897	3.59836				
Business training	31.9003	3.41604	.682	47	.000	Significant

From table 1, it was observed that there was a relationship between the independent variable and the dependent variable in the order of (r = 0.682, p <.05). On this premise, the researcher concluded that there was relationship between a business training and SMEs performance in Lagos State.

Research Question 2: What is the relationship between ICT training and SMEs' performance in Lagos State?

Table 2: Relationship between ICT training and SMEs' performance in Lagos State

Variables	Mean	SD	r-value	df	p-value	Remark
SMEs performance	31.9897	3.59836	.320	47	.031	Significant
ICT training	31.8213	3.61735				

Table 2 revealed that there was a significant relationship between the independent variable and the dependent variable in the order of ($r = 0.320$, $p < .05$). On this premise, the researcher concluded that there was a relationship between ICT training and SMEs' performance in Lagos State.

$H_0$1: There is no significant composite contribution of capacity building (business and ICT trainings) on SMEs performance in Lagos State.

Regression

Table 3: Model Summary on the composite contributions of capacity building (business and ICT trainings) on SMEs performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.701[a]	.492	.483	2.58808

a. Predictors: (Constant), Business and ICT trainings

Table 3 showed that there were significant composite contributions of the independent variables (business and ICT trainings) on the dependent variable (SMEs performance); $R = 0.701$, $p < .05$, which implied that the null hypothesis was rejected. The table further revealed (Adj. $R^2 = 0.482$) that about 48% of the variance in SMEs' performance was accounted for by the linear combination of the independent variables.

$H_0$2: There is no significant relative influence of capacity building (business and ICT trainings) on SMEs performance in Lagos State.

Table 4: Relative influence of capacity building (business and ICT training) on SMEs performance in Lagos State

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.402	1.935		2.275	.024
	Business Training	.589	.079	.559	7.467	.000
	ICT Training	.450	.077	.546	4.659	.004

a. Dependent Variable: SMEs' performance

Table 4 showed that the sign of the coefficient of (business and ICT trainings) were positive which implied that an increase or improvement in any of these will increase SMEs performance. All the two independent or explanatory variables examined were found to be significant and strongly determine SMEs performance with their P-value less than 0.05. Sign of Business training ($\beta = .559$, $t = 7.467$, $p < .05$) and ICT training ($\beta = .546$, $t = 4.659$). This implied that null hypothesis was rejected, and the researcher concluded that significant relative influence of capacity building (business and ICT trainings) on SMEs' performance in Lagos State.

Discussion of Findings

The findings of the study indicated that capacity building through business and ICT training are positively related to SMEs performance in the study area. Also, these explanatory variables found to be jointly and relatively influenced SMEs performance. The implications of this result were that more SMEs attend capacity building programme of business and ICT will made they know and acquired business and ICT skills for performance. This may further engender their capability in skills building towards efficiency by participating in online business engagement which will reduce physical operational cost, create worldwide awareness about their services and products and eventually may enhance sales volume, profitability and higher performance. These findings agreed with Ayo-Balogun, Hadir and Adepoju (2024) who have reported that SMEs with skills and knowledge in digital innovation tools will increase performance more than their colleagues in business who do not have such skills. They further found that most SMEs in Nigeria today seems to be lacking behind in desirability skills of ICT needed to efficiency operate in emerging market.

Thus, the need for further training sessions on how best to develop ICT knowledge among SMEs for optimum performance. Hassan, Ojukwu and Kadiri (2023) found that having received ICT training by SMEs is a guaranteed way towards achieving performance in business by enhancing their business flexibility, create more awareness to potential customers, reduces firm operational cost, less time in goods and services delivery, smooth and efficiency communication between the firm and customers. Kithae and Keino (2016) findings were in support to the study findings in such that business training allows SMEs to have inept knowledge on current related activities that might have positive impact on their performance; likewise, Eyanuku (2022) asserted that part of the factors leading to SMEs failure in developing countries is that many of them find it difficult to invest in capacity building development as it relate to business engagement training and other related issues. The author further suggested that receiving business training could give SMEs insight into viable business opportunities to engage in and manners in which this can be processed, so that in long run, the development can enhance their performance and sustainability.

Conclusion

This study has examined capacity building as panacea to SMEs performance in Lagos State Nigeria, the following conclusions were drawn based on the findings of the study that there was relationship between business training, ICT training and SMEs performance in Lagos State. It was also concluded that there were significant composite and relative contributions of the business and ICT training on SMEs performance.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. Government through the Ministry of Commerce and Industry should annually organize capacity building programme for SMEs in the state on how to equip them with necessary skills in business and ICT needed for performance.
2. SMEDAN as a matter of urgency should raise their bar on developing scheme of training exercises on new digital innovations that can be adopted by SMEs on effective participation in global economies.
3. SMEDAN also needs to organise a kind of mentoring workshops for all SMEs in Lagos state on the need to develop their selves in business and ICT training, most especially in this emerging economies period so that their level of engagement in business activities across the globe could increase

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APPLICATION AND INTEGRATION OF INFORMATION AND COMMUNICATION TECHNOLOGY IN TEACHING AMONG SOCIAL STUDIES TEACHERS IN BENUE STATE, NIGERIA

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ABSTRACT

This study examined the application and integration of information and communication technology in teaching among social studies teachers in Benue State, Nigeria, from a group, pre-test post-test quasi-experimental design. A sample of 224 Social Studies Teachers (130 males and 94 females) was selected from 36 Upper Basic Schools across the three Education Zones of the State using a multistage sampling technique. The instrument used for data collection was Social Studies Teachers ICT Skills Observation Scale (SSTISOS) developed by the researchers. Validity of the instrument was established through expert reviews, while reliability was tested through a pilot study involving 30 Social Studies teachers who were not part of the main study. Through a test-retest method on the instrument's consistency over time, a reliability coefficient of 0.82 was obtained. Two research hypotheses were tested at the significance level of 0.05 and the results showed that there was no difference in the mean skill scores between male and female Social Studies teachers before and after exposure to ICT training ($p < 0.05$). In conclusion, this study has highlighted the critical role of ICT training in enhancing the skills of Social Studies teachers in Benue State. The results also indicate that gender does not significantly influence skill acquisition in ICT, reinforcing the importance of creating inclusive training environments that cater to all educators. Implementation of Continuous Professional Development Programs, Promotion of Gender Equity in Training Opportunities, etc. were then recommended.

Keywords: ***Information and communication Technology, Social Studies, Application, Integration.***

Introduction

Education in Nigeria has shifted from the traditional methods of face-to-face tuition and the transaction of paper-based teaching and learning materials to learning via Information and Communication Technologies (Lee & Cha, 2022). The use of ICT in instruction is sometimes referred to as "Technology-Based Instruction." (Muslimin et al., 2022) In the

Nigerian context, the development of ICT is part of the National Educational Reform, aiming at the need to reform and modernise the present-day teacher via the application of ICT for effective teaching and learning. As a result, the researcher is interested in finding out the extent to which practising and would-be teachers integrate ICT in the preparation of teaching in social studies. This has necessitated the conduct of this study.

Many studies have demonstrated that the use of ICT enhances learning and teaching. In Nigeria, schools have not been an exception, as the use of ICT has spread across all schools in the country (Jummai, 2021). In addition, the use of ICT in teaching K-12 science highlights the need for research that investigates the how Social Studies teachers will use ICT in classroom instructions in Benue State. The study was conducted in Benue State (Achor et al., 2020). It was noted that ICT has gained ground in the state, where it is incorporated into every facet of life, including education. Some of the interesting features of Benue State are its high level of ICT penetration. Some of the significant challenges facing Benue State are how teachers will use ICT in delivering instruction. National policy on education demands that teachers should continually acquire new skills, such as the use of ICT for instructional activities. The concern is how teachers who may not be ICT compliant will use ICT for instructional delivery (Esfijani & Zamani, 2020).

The advent of recent technological prominence has led to the establishment of Information and Communication Technology methods, including mobile smartphones, digital libraries, electronic mail, and other communication channels. State-of-the-art technology is required for its usability and performance in advanced countries, since ICT has vastly contributed to progress and development in all areas of the world (Wang et al., 2021). Hence, Nigeria is working towards incorporating ICT into its activities and making it available to its populace for real-time operations because of globalization (Khalifa et al.2021). However, this is a little different in the education sector, as Nigerian educators are still struggling to adapt to ICT usage. Nowadays, the teaching of Social Studies is not producing positive outcomes in Nigeria, as shown by research. As a result, Social Studies educators in Nigeria are unable to deliver creatively and engagingly. This is one of the problems with the teaching material used by Social Studies educators.

A significant problem that has been presented is that low-income educators have failed to apply ICT teaching in their classrooms due to a shortage of computer labs, poor governance, lack of resources, lack of data communication, and so on. Nonetheless, these practices have left Nigerian Social Studies teachers stripped of the know-how to use digital technology to train in the liberal arts sector. Therefore, despite the fact that digital technology is currently being heavily used, Nigerian Social Studies teachers have declared that they have a positive attitude but do not use knowledge and information technology in their daily activities. They have a strong desire to enhance their teaching practices through the use of educational technology such as computer programming, instructional design, and computer-based training (Blair & Shawler, 2020).

Purpose of the study

1. To examine the differences in the mean skill scores of Social Studies teachers before and after exposure to ICT training in the utilisation of ICT facilities in classroom pedagogy.
2. To assess the differences in the mean skill scores between male and female Social Studies teachers before and after exposure to ICT training in the utilisation of ICT facilities in classroom pedagogy.

Research Hypothesis

H_{01}: There is no significant difference in the mean skill scores of Social Studies teachers before and after exposure to ICT training in the utilization of ICT facilities in classroom pedagogy.

H_{02}: There is no significant difference in the mean skill scores between male and female Social Studies teachers before and after exposure to ICT training in the utilization of ICT facilities in classroom pedagogy.

Methodology

This research utilized a one-group, pre-test post-test quasi-experimental design to assess the effects of a training program on the ICT skills of Social Studies teachers. The study involved a population of 508 teachers (294 males and 214 females) from 303 Upper Basic Schools across Benue State, encompassing both urban and rural educators. This diverse population was sourced from the Benue State Teaching Service Board (2017) records and presents a range of experience and access to ICT tools. The inclusion of both genders contributes to a balanced understanding of the impact of ICT training on instructional practices in the field. This study later focused on a sample size of 224 Social Studies teachers (130 males and 94 females) selected from 36 Upper Basic Schools across three educational zones in Benue State, representing about 44% of the total population of Social Studies teachers in the state. The researchers utilized a multistage sampling technique to ensure proportional representation from the Benue North-East, Benue North-West, and Benue South zones. Initially, schools were stratified by geographical zones, followed by simple random sampling to select schools within each zone. The final selection involved randomly choosing Social Studies teachers from these schools, guaranteeing that all teachers had an equal opportunity to participate in the study. Inclusion criteria for the study focused on teachers with a minimum of one year of teaching experience, excluding those with less experience.

The data collection utilized the Social Studies Teachers ICT Skills Observation Scale (SSTISOS), specifically designed by the researchers, which includes 20 items assessing teachers' ICT skills, particularly in computing. The instrument employs a 5-point Likert scale for detailed evaluation from "Not Skillful" to "Very Skillful." The SSTISOS comprises three sections: demographic information, basic computer skills knowledge, and the application of ICT in the classroom. It was administered twice before and after training to measure changes in ICT proficiency. The validity of the SSTISOS was confirmed through expert reviews. The study evaluated the SSTISOS instrument for clarity, relevance, and alignment with study objectives. The instrument's reliability was tested through a pilot study involving 30 Social Studies teachers. A reliability coefficient of 0.82 was obtained. Data collection was conducted in three stages: pre-test, training, and post-test. The pre-test assessed baseline ICT skills, the training program improved computer skills, and a post-test measured improvements after the training. Data was analysed using descriptive and inferential statistical methods. The study used descriptive measures and inferential statistics to compare pre-test and post-test scores of teachers' ICT skills in Benue State. The paired-samples t-test was used to assess the effectiveness of the ICT training program in improving Social Studies teachers' skills.

Results

Demographic Information of Respondents

Table 1: Gender Distribution of Respondents

Gender	Frequency (n)	Percentage (%)
Male	130	58.0%
Female	94	42.0%
Total	**224**	**100.0%**

The gender distribution of the respondents reveals a majority of male Social Studies teachers. Out of the total participants, 130 (58.0%) were male, while 94 (42.0%) were female. This shows a higher representation of male teachers in the study sample, indicating that the teaching profession in Social Studies, within the study population, might be more male-dominated. However, the female population still forms a significant portion of the workforce, representing a notable share of the teaching group.

Table 2: Years of Teaching Experience

Years of Experience	Frequency (n)	Percentage (%)
1 – 5 years	40	17.9%
6 – 10 years	90	40.2%
11 – 15 years	60	26.8%
16 years and above	34	15.2%
Total	**224**	**100.0%**

Regarding teaching experience, the largest group of respondents has between 6 – 10 years of teaching experience, representing 40.2% of the sample, followed by those with 11 – 15 years of experience (26.8%). Teachers with 1 – 5 years of experience account for 17.9%, and those with over 16 years of experience make up 15.2% of the participants. This suggests a broad range of professional experience among the respondents, with a significant portion possessing over a decade of classroom experience. Teaching experience may affect the teachers' pre-existing skills in utilizing ICT tools, as more experienced teachers might be accustomed to traditional methods of teaching.

Table 3: Access to ICT Tools in School

Access to ICT Tools	Frequency (n)	Percentage (%)
Yes	190	84.8%
No	34	15.2%
Total	**224**	**100.0%**

An overwhelming majority of respondents, 84.8%, indicated that they have access to ICT tools in their schools, while 15.2% reported a lack of access. This demonstrates that most schools in the study sample are equipped with basic ICT facilities, providing teachers the opportunity to apply the skills they acquire through ICT training. Teachers without access to these tools may face difficulties in implementing what they have learned, underscoring the need for equitable resource distribution in schools. Ensuring that all teachers, regardless of their school's resource base, have adequate access to ICT facilities is fundamental to maximizing the impact of the training program.

Test of Hypotheses

H0₁: There is no significant difference in the mean skill scores of social studies teachers before and after exposure to ICT training in the utilization of ICT facilities in classroom pedagogy.

Table 4: Paired T-Test for HI

Test	N	Mean	Standard Deviation (SD)	Standard Error Mean (SE)	T-Statistic	df	p-Value
Pretest	5	48.6	3.15	1.41			
Posttest	5	68.2	2.47	1.10	**-15.34**	4	**0.00002**

The paired T-Test gave us the two means (pretest and posttest), which are 48.6 and 68.2, respectively. It also gave us the probability value of 0.00002, which is less than the significance value of 0.5 indicating a significant difference in the skill levels of Social Studies teachers before and after ICT training. The degree of freedom (df) was 4 calculated from N – 1 = 5 where N is the number of pairs (in this case, 5) and standard deviations of 3.15 and 2.47, respectively.

Test for hypothesis 2

H0₂ :: There is no significant difference in the mean skill scores between male and female Social Studies teachers before and after exposure to ICT training in the utilisation of ICT facilities in classroom pedagogy.

Table 5: Comparison of Male and Female Pre-Test Mean Skill Scores Using t-Test:

Group	Mean Score	Standard Deviation	Sample Size	t-Statistic	p-Value
Male Pre-Test	60.5	8.2	130	1.77	0.08
Female Pre-Test	58.2	7.9	94		

Interpretation: The p-value of 0.08 is greater than the significance level ($\alpha = 0.05$), so we **fail to reject** the null hypothesis ($H_0 1$), meaning there is no statistically significant difference in pre-test mean skill scores between male and female teachers.

Comparison of Male and Female Post-Test Mean Skill Scores Using t-Test:

A two-sample t-test is performed to compare the post-test mean skill scores between male and female teachers.

Table 6: Comparison of Male and Female Post-Test Mean Skill Scores Using t-Test:

Group	Mean Score	Standard Deviation	Sample Size	t-Statistic	p-Value
Male Post-Test	75.3	6.5	130	0.85	0.39
Female Post-Test	74.1	6.2	94		

Interpretation: The p-value of 0.39 is greater than the significance level ($\alpha = 0.05$), so we fail to reject the null hypothesis ($H_0 2$), meaning there is no statistically significant difference in post-test mean skill scores between male and female teachers.

Discussion of Findings

The findings from this study provide valuable insights into the impact of ICT training on the skills of Social Studies teachers. The significant difference in mean skill scores before and after the training suggests that targeted ICT training can effectively enhance the proficiency of educators in utilising ICT tools for classroom pedagogy. This aligns with existing literature that emphasises the importance of continuous professional development in integrating technology into

teaching practices (Koehler & Mishra, 2019). The increase in skills indicates that teachers are likely to feel more confident in using ICT resources, which can lead to improved instructional methods and student engagement. Additionally, the results show that male and female Social Studies teachers had similar mean skill scores before and after the ICT training (Lee & Cha, 2022). This finding suggests that gender does not significantly affect the ability to acquire ICT skills in this context. It reflects the idea that, when provided with equal opportunities for training, both male and female teachers can achieve comparable levels of proficiency (Mumtaz, 2000). This is a positive development in promoting gender equality in educational settings, as it highlights that ICT training can be beneficial regardless of gender. The fact that a statistically significant improvement in skills was observed post-training underscores the necessity for institutions to invest in regular ICT training programs. Such training can equip teachers with the necessary competencies to integrate technology into their teaching effectively. The enhancement of these skills may contribute to a more dynamic and interactive learning environment, ultimately benefiting students' learning experiences. It is crucial for educational authorities to recognize this and provide ongoing support for ICT training initiatives. Furthermore, the study's findings resonate with the growing recognition of ICT's role in modern education. The ability to leverage technology not only facilitates the delivery of content but also enables personalized learning experiences that cater to diverse student needs (Hattie, 2009). As educators develop their ICT skills, they can adopt innovative teaching methods, fostering a more engaging and effective learning atmosphere.

In terms of practical implications, the results emphasize the importance of designing ICT training programs that are relevant and tailored to the specific needs of Social Studies teachers. Training should incorporate real-world applications of ICT in the teaching of social studies, including tools for creating multimedia presentations, accessing online resources, and implementing collaborative learning platforms. This approach can enhance the transfer of skills from training to actual classroom practice. By monitoring and evaluating the ongoing impact of ICT training, educational authorities can make informed decisions about future training initiatives and resource allocation. Lastly, the significant difference observed in skill scores post-training raises questions about the adequacy of pre-training skill levels among teachers (Lee & Cha, 2022). It is crucial to assess teachers' initial competencies to tailor training programs effectively. A comprehensive needs assessment can help identify specific areas where teachers require support, leading to more focused and effective training interventions. In conclusion, this study highlights the positive impact of ICT training on Social Studies teachers' skills, affirming the need for continued investment in teacher professional development. While gender did not emerge as a significant factor in skill acquisition, the findings underscore the necessity of creating equitable training opportunities for all teachers.

Conclusion

Looking ahead, the findings of this study underscore the urgent need to scale up ICT training initiatives for Social Studies teachers across Benue State and beyond. While the intervention proved effective in enhancing teachers' ICT skills, the next step involves institutionalizing such training through policy-backed, continuous professional development programs. Education authorities should integrate ICT capacity-building into regular in-service training and ensure it is accessible to all teachers, regardless of location or gender.

Furthermore, a sustainable scaling strategy would involve the development of a standardized ICT integration framework tailored to local contexts, supported by ongoing mentorship, access to digital tools, and school-based ICT support teams. Partnerships with ICT providers, teacher training institutions, and NGOs can facilitate wider reach and innovation. Future

studies should also explore longitudinal impacts of ICT training on classroom practices and student outcomes, providing deeper insight into how technology can be effectively leveraged for transformative teaching and learning in Social Studies education.

Recommendations

Based on the findings of this study, several recommendations can be made to enhance the integration of ICT in education, particularly for Social Studies teachers in Benue State. These recommendations are aimed at educational authorities, policymakers, and school administrators to foster a more effective use of technology in teaching and learning.

1. **Implement Continuous Professional Development Programs**: Educational institutions should prioritize the establishment of regular and ongoing professional development programs focusing on ICT skills for teachers. Such initiatives should be designed to update teachers on the latest technological advancements and pedagogical strategies for integrating ICT into their teaching practices.
2. **Promote Gender Equity in Training Opportunities**: Given the findings that both male and female teachers benefited equally from the training, it is crucial to ensure that all educators have equal access to professional development opportunities. Programs should be designed to encourage collaboration and support among teachers, fostering an inclusive environment where both genders can thrive.
3. **Establish ICT Resource Centers**: Schools should invest in setting up ICT resource centers equipped with the necessary tools and resources for teachers and students. These centers can serve as hubs for training, collaboration, and experimentation with new technologies, providing teachers with hands-on experience in utilizing ICT in their lessons.
4. **Incorporate ICT in Teacher Education Programs**: A phased 12-months ICT integration plan be implemented, providing laptops, projectors, internet access, educational software, digital content, and power backup systems alongside targeted training, pilot testing, and strategic partnership to equip social studies teachers in Benue State for effective technology-enhanced instructions.

By implementing these recommendations, educational stakeholders can create a more conducive environment for the effective integration of ICT in teaching and learning. Such efforts will not only enhance the skills of Social Studies teachers but also improve the overall educational experience for students, preparing them for a technology-driven future.

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ASSESSMENT OF FACTORS AFFECTING FOOTBALL TALENT IDENTIFICATION AND SELECTION IN AGE-GROUP COMPETITIONS IN LAGOS STATE

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ABSTRACT

This study investigates the multifaceted factors influencing football talent selection in age-group competitions within Lagos State, Nigeria. Given the critical role of early talent identification for national sporting success, the research explores the impact of technical skills, subjective assessments, external influences, and socioeconomic factors on the selection process. The study employs a descriptive research design, involving 200 participants, and uses regression analysis for data interpretation. Findings reveal that biases and inconsistencies in selection criteria often overshadow merit, disadvantaging players from lower socioeconomic backgrounds and compromising the fairness and integrity of the process. The study underscores the necessity for transparent, objective, and inclusive talent identification systems to foster equitable opportunities and enhance the development of Nigerian football. Recommendations include implementing standardized evaluation methods and addressing external pressures to ensure a more meritocratic selection process.

Kevwords: **Football Talent, Age-Group Competitions, Technical Skills, Attributes, Subjective Assessments.**

Introduction

Football, often referred to as "the beautiful game," holds a significant place in the cultural and social fabric of Nigeria. As the most popular sport in the country, football serves as a source of national pride and unity. The process of talent selection in football is crucial for building successful national teams and advancing the sport within Nigeria. Effective talent selection systems are designed to uncover raw talent that can be nurtured into future stars through tailored training and development programs. However, the talent selection process in age-group competitions in Lagos State is fraught with challenges, including a lack of transparency and objectivity. Subjective criteria such as personal relationships or coach bias can lead to the exclusion of deserving players, affecting the overall integrity of the selection system.

The research problem lies in the lack of transparency and objectivity in talent selection processes for age-group

competitions in Lagos state. This lack of clarity and fairness hinders the development of young talent and raises concerns about the overall integrity of the selection system. The use of subjective criteria, such as personal relationships or coach bias, can unfairly advantage certain players over others, leading to the exclusion of deserving talent. Ajayi (2017) reported that personal biases and preferences often affect selection decisions in Nigerian sports. Coaches and selectors may favour players from certain regions, ethnic groups, or social backgrounds, leading to a perception of unfairness and discrimination.

The absence of standardized evaluation methods across different competitions and age groups creates inconsistency and raises questions about the validity of selection decisions. A lack of clear communication about selection criteria and decision-making processes leaves players and coaches in the dark, breeding frustration and distrust in the system. The absence of effective oversight mechanisms and clear accountability measures creates an environment where favouritism and corruption can thrive. Christensen (2009) found that subjective factors frequently influence talent identification in soccer. His research highlights the role of "practical sense" and intuitive judgments in the selection process, which can be influenced by personal biases and cultural norms. Christensen argues that while subjective assessments can provide valuable insights into players' potential, they need to be balanced with objective criteria to ensure fairness and transparency. The perception of unfairness can discourage promising players from participating in the system, leading to a loss of potential for the future of football in Lagos state. A lack of transparency and objectivity can demotivate coaches and players, negatively impacting their engagement and performance. The perception of bias and corruption in the selection process can damage the public's trust in the sport and its governing bodies.

This research problem is crucial to address as it directly impacts the future of football in Lagos state. By conducting thorough research and proposing effective solutions, we can work towards establishing a more transparent, objective, and fair talent selection system that fosters the development of young talent and contributes to the overall success of the sport. Local studies, such as Adeyanju (2015), have highlighted similar concerns about transparency and objectivity in sports selections in Nigeria. Adeyanju argues that the lack of standardized criteria and the influence of personal biases among selectors lead to a perception of unfairness and favouritism in the selection process. Technical skills are undeniably crucial in talent identification for football, particularly in age group competitions. They form the foundational layer upon which other factors like potential, tactical awareness, and mental aptitude can be built. Here's why technical skills hold such importance. Strong technical skills directly translate to better on-field performance. Players with excellent ball control, passing accuracy, shooting technique, and tactical understanding showcase their potential through their actions on the pitch. Standardized assessments of basic technical skills (dribbling, passing, shooting) provide a quantitative basis for initial talent identification, especially in early age groups when other factors may be less discernible.

Technical skills offer a relatively objective basis for initial talent identification compared to subjective criteria like physical attributes or personality traits. Standardized assessments and performance metrics can help minimize bias and identify players with genuine technical talent. While technical skills shouldn't be the sole determining factor, they provide a clear and measurable starting point for talent selection, especially in large-scale competitions with limited time for in-depth evaluations. However, it's important to remember that technical skills are only one piece of the puzzle in talent identification. A holistic approach considering other factors like athleticism, tactical awareness, mental strength, and potential for development is crucial for selecting well-rounded players with the ability to reach their full potential. By using objective measures of technical skills alongside other assessment methods, talent identification processes can

become more transparent, objective, and effective, ultimately leading to the development of better players and stronger national teams. Technical skills offer a tangible foundation for evaluating young players' potential. They provide objective metrics and allow for standardised assessments, minimising bias and subjectivity. Mastering these skills early on demonstrates a player's aptitude for learning, adaptability, and dedication, all essential qualities for future success.

Statement of the Problem

Despite widespread participation in age-group football competitions in Lagos state, identifying and nurturing the next generation of talented players remains shrouded in subjectivity and potential biases. This lack of transparency and objectivity in talent selection processes can result in critical problems: Unfulfilled potential, talented footballers from disadvantaged backgrounds, without access to quality training or facing socioeconomic obstacles, miss opportunities to be identified and developed, hindering their potential contributions to the national game. Subjective assessments, coaches' personal preferences and biases, often overshadowing technical skills and merit, can influence selection decisions, leading to the selection of players based on subjective criteria rather than genuine talent

Purpose of the study

This study aims to investigate the multifaceted factors influencing football talent selection in age-group competitions within Lagos State, Nigeria. Specifically, this study:

1. Investigate the relationship between technical skills and attributes in football talent identification and selection in age group competitions in Lagos State.
2. Ascertain the relationship between subjective assessments in football talent identification and selection in age group competitions in Lagos State.

Research Hypothesis

The following research hypotheses were postulated for the study;

1. There is no significant relationship between technical skills and attributes in football talent identification and selection in age group competitions in Lagos State.
2. There is no significant relationship between subjective assessments in football talent identification and selection in age group competitions in Lagos State.

Methodology

This study employed a descriptive research method to investigate the factors affecting football talent identification and selection in age-group competition in Lagos state. The approach aimed to describe and analyse the phenomenon of talent selection without manipulating variables or establishing casual relationships. The emphasis was on understanding the characteristics, patterns, and relationships between various factors within the selection process. The population of this study consists of all football coaches and players in Somolu Local Government area of Lagos State. The sample for this was drawn from the football coaches and players in Somolu Local Government in Lagos state. The sample size consists of 200 respondents who were randomly selected from the football coaches and players in Somolu Local Government in Lagos state. The stratified sampling technique was used in selecting the sample. A self-developed questionnaire was used for data collection. The questionnaire was in two sections. Section A was used for the collection of information on personal data of respondents while Section B contained a list of test items to which respondents answered based on their opinion. The study was carried out using this questionnaire.

The questionnaire was sent to the project supervisor for review to guarantee the construct and content validity of the research tool. Other specialists' opinions in the Department of Human Kinetics and Health Education were also sought before the questionnaire's final draft was created. The reliability of the research instrument was determined through a test re-test reliability method by distributing twenty (20) validated questionnaires twice to footballers in Lagos Mainland Local Government Area who would not be part of the study within two-week intervals. The data was collected and analyzed using the Person's product-moment correlation to ascertain the reliability coefficient of the research instrument. A total of two hundred (200) copies of the questionnaire were administered to the sample subjects selected for the study. The questionnaire was distributed and retrieved on the spot to prevent loss and damage. The responses of the subjects were used to develop a frequency and percentage distribution table for analysis. The inferential statistics of regression analysis were used to test all stated hypotheses at a 0.05 level of significance.

Results

Descriptive Analysis of Data

Section A Table 1: Distribution of Respondents by Age

Age	Frequency	Percentage
15years & Below	4	2.0
16 – 20 years	33	16.5
21 – 25 years	116	58.0
26years & Above	47	23.5
Total	200	100.0

Table 1 above shows the distribution of respondents by Age, 4(2.0%) of the total respondents are between the ages of 15 years and below, 33(16.5%) of the total respondents are between the ages of 16 and 20 years, 116(58.0%) of the total respondents are between the ages of 21 and 25 years, 47(23.5%) of the total respondents are between the ages of 26 years and above.

Table 2: Demographic characteristics of respondents by Gender

Gender	Frequency	Percentage (%)
Male	108	54.0
Female	92	46.0
Total	200	100.0

Table 2 above shows the distribution of respondents by gender, it showed that 200 respondents represented 100% of the total population where 108(54.0%) were male and 92(46.0%) were female.

Table 3: Distribution of Respondents by Role in Competition

Role in competition	Frequency	Percentage (%)
Coach	26	13.0
Player	174	87.0
Total	200	100.0

Table 3: above shows the distribution of respondents by the role in age group competition, it shows that 26(13.0%) of the population are Coaches and 174(87.0%) of the total population are Players.

Research Hypothesis 1

There is no significant relationship between technical skills and attributes and football talent selection in age group competitions in Lagos state.

Table 3: Relationship Between Technical Skills and Attributes and Football Talent Identification

Coefficients		Unstandardized Coefficients	Standardized Coefficients	t	Sig.
		B	Beta		
Football Talent Selection (Constant)		1.208		2.950	.004
Technical Skills and Attributes		0.110	0.307	4.536	<.001

From Table 3 above,

Constant: The intercept of 1.208 suggests that when technical skills and attributes are zero, the expected value of the lack of objectivity and transparency is 1.208. Technical Skills and Attributes: The coefficient of 0.110 indicates that for every one-unit increase in technical skills and attributes, there is a 0.110-unit increase in the lack of objectivity and transparency. Standardized Coefficients (Beta): This shows the relative importance of each predictor variable. Here, technical skills and attributes (Beta = 0.307) have a moderate positive standardized coefficient, indicating a significant but moderate relationship with the dependent variable. The statistical analysis rejects this hypothesis. The regression model demonstrates that technical skills and attributes have a statistically significant positive relationship with the lack of objectivity and transparency in the selection process. Specifically:

The model explains about 9.4% of the variability in the lack of objectivity and transparency.

The regression coefficient (0.110) suggests that higher technical skills and attributes are associated with a greater perceived lack of objectivity and transparency in the selection process.

The p-value (<.001) from ANOVA indicates that the relationship is highly significant.

Therefore, based on this analysis, technical skills and attributes indeed play a significant role in influencing the perceived objectivity and transparency of football talent selection processes in age group competitions in Lagos State.

Research Hypothesis 2

There is no significant relationship between subjective assessments and football talent selection in age group competitions in Lagos state.

Table 4

Coefficients		Unstandardized Coefficients	Standardized Coefficients	t	Sig.
		B	Beta		
Football Talent Selection (Constant)		-.646		-2.187	.030
Subjective Assessments		.237	.668	12.634	<.001

From table 4 above,

Constant: The intercept of -0.646 suggests that when the subjective assessments are zero, the expected value of the lack of objectivity and transparency is -0.646.

Subjective Assessments: The coefficient of 0.237 indicates that for every one-unit increase in subjective assessments, there is a 0.237-unit increase in the lack of objectivity and transparency.

Standardized Coefficients (Beta): This shows the relative importance of each predictor variable. Here, subjective assessments (Beta = 0.668) have a strong positive standardized coefficient, indicating a strong relationship with the

dependent variable.

The statistical analysis strongly rejects this hypothesis. The regression model shows that subjective assessments have a significant positive relationship with the lack of objectivity and transparency in the selection process. Specifically:

1. The model explains about 44.6% of the variability in the lack of objectivity and transparency.
2. The regression coefficient (0.237) suggests that higher subjective assessments are associated with a greater perceived lack of objectivity and transparency in the selection process.
3. The p-value (<.001) from ANOVA indicates that the relationship is highly significant.

Therefore, based on this analysis, subjective assessments indeed play a significant role in influencing the perceived objectivity and transparency of football talent selection processes in age group competitions in Lagos State.

Discussion of Findings

The first finding established that there will be a significant relationship between technical skills and attributes in football talent selection in age group competitions in Lagos state, the regression model demonstrates a statistically significant positive relationship between technical skills and the perceived lack of objectivity and transparency in the selection process ($R^2 = 0.094$, $p < 0.001$). This suggests that while technical skills are important in talent identification, their evaluation might contribute to perceived biases in the selection process. In the context of Lagos State, technical skills such as dribbling, passing accuracy, shooting, and tactical awareness are highly valued in the selection process. However, the assessment of these skills is often subjective and can be influenced by the selectors' preferences and biases. Local studies, such as Adeyanju (2015), have highlighted similar concerns about transparency and objectivity in sports selections in Nigeria. Adeyanju argues that the lack of standardized criteria and the influence of personal biases among selectors lead to a perception of unfairness and favouritism in the selection process. The influence of technical skills on the selection process can be linked to the broader issue of coaching and talent development in Nigeria. Coaches often prioritize players with exceptional technical abilities, sometimes at the expense of other important attributes such as physical fitness, mental toughness, and teamwork. This narrow focus on technical skills can limit the potential of the team and overlook talented players who may excel in other areas.

The second finding established that there will be a significant relationship between subjective assessments and football talent selection in age group competitions in Lagos State, the regression model indicates that subjective factors explain 44.6% of the variance in the perceived lack of objectivity and transparency ($R^2 = 0.446$, $p < 0.001$). This suggests a strong influence of subjective judgments on player selection, which can lead to biases and favouritism. Subjective assessments can include personal biases, preferences, and the influence of external factors such as political pressure and financial incentives. Ajayi (2017) reported that personal biases and preferences often affect selection decisions in Nigerian sports. Coaches and selectors may favour players from certain regions, ethnic groups, or social backgrounds, leading to a perception of unfairness and discrimination. Christensen (2009) found that subjective factors frequently influence talent identification in soccer. His research highlights the role of "practical sense" and intuitive judgments in the selection process, which can be influenced by personal biases and cultural norms. Christensen argues that while subjective assessments can provide valuable insights into players' potential, they need to be balanced with objective criteria to ensure fairness and transparency. The influence of subjective assessments on talent selection in Lagos State can be attributed to several factors. First, the lack of standardized evaluation criteria and training for selectors can lead to inconsistent and biased judgments. Second, the influence of external factors such as political pressure and financial incentives can compromise the integrity of the selection process. Finally, cultural norms and social expectations can shape the

perceptions and preferences of selectors, leading to biases in the selection process.

Conclusion

In conclusion, technical skills and attributes play a critical role. The ability of young players to demonstrate proficiency in fundamental football techniques such as dribbling, passing, shooting, and tactical awareness significantly influences their selection. Coaches and scouts prioritize players who exhibit superior technical abilities, as these skills are essential for effective gameplay and further development in the sport. According to recent studies, there is a positive correlation between the technical competence of players and their likelihood of being selected for higher levels of competition.

Furthermore, subjective assessments are also a significant factor in talent selection. This involves the evaluations made by coaches and scouts based on their observations and personal judgments. These assessments often include a player's attitude, work ethic, coachability, and overall potential. Despite the inherent biases and inconsistencies that can arise from subjective evaluations, they remain an integral part of the selection process due to the nuanced and holistic understanding they provide of a player's capabilities and prospects.

Recommendatıons

1. There should be established and standardized criteria for talent selection that include both technical skills (e.g., dribbling, passing accuracy, shooting, tactical awareness) and non-technical attributes (e.g., physical fitness, mental toughness, teamwork). This scoring system will ensure objectivity and minimize personal biases in player evaluation.
2. The use of performance analytics software and objective testing methods (e.g., fitness tests, and skill assessments) to quantify players' abilities should be introduced. This will provide evidence-based assessments

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CAREER PATHWAYS AND JOB CREATION IN THE 21ST CENTURY AS ISSUES IN TECHNICAL EDUCATION FOR NATIONAL DEVELOPMENT

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ABSTRACT

This study investigates the significant relationship between career pathways and job creation in the 21st century, identifying these issues as crucial aspects of technical education for national development. The study posed two research questions and formulated two hypotheses, which were tested at a significance level of 0.05. A survey research design was employed, collecting data from a sample of 80 respondents, including 20 lecturers and 60 students from the Kwara State Colleges of Education (Technical) in Ilorin and Lafiagi. Participants were selected using a multi-stage sampling technique. Data analysis incorporated both descriptive and inferential statistics. The findings underscore the importance of technical education in facilitating career pathways and creating employment opportunities indicating a need for substantial improvement, while the level of job creation and substantial enhancement remain imperative. The study recommends that policymakers and stakeholders implement programs that support technical education and career pathways, thereby facilitating improved employment opportunities for youth and advancing national development.

Kevwords: **Technical Education, Career Pathways, Job Creation, National Development.**

Introduction

In order to enhance living standards and stimulate economic growth, every nation is required to devise strategies that address socio-political and economic challenges. These strategies are typically integrated into national development frameworks aimed at fostering comprehensive research and development crucial for achieving substantial and sustainable economic growth. Key components include upgrading infrastructure, promoting social equity, improving access to

information, and elevating the quality of education to advance economic progress and inform future occupational trends. Over the next 50 years, certain jobs are expected to emerge, while others may decline or become obsolete. For instance, Chan (2020) forecasts that 23% of jobs will undergo transformation by 2027, resulting in the creation of 69 million new positions while simultaneously eliminating 83 million. As highlighted by Săveanu et al. (2023), the fundamental pillars of contemporary society rely heavily on technology and innovation as drivers of societal transformation. The primary challenges associated with this transformation in technical education include the escalating influence of rapid technological innovation, a migration toward knowledge-intensive industries and services, and increasing demands for skill acquisition. Technological advancement, coupled with a highly skilled workforce, is a critical determinant of economic growth (Ogundele, 2021). It is therefore essential to align emerging issues related to career pathways and job creation with technical education and skill development.

Technical education and skill development are structured to equip individuals with the necessary scientific knowledge, skills, and competencies for specialization in specific trades or professions. This form of education empowers individuals to attain self-sufficiency, compete effectively in the workforce, and engage in entrepreneurship or job creation. According to Ogundele & Umar (2020), technical education provides recipients with foundational scientific knowledge and practical skills. The acquisition of practical skills, along with the related attitudes, understanding, and knowledge, is integral to career pathways across various sectors of economic and social life (Federal Government of Nigeria, 2013). The overarching goal of technical education is to reform and enhance the provision of skills, vocations, science, and technology to address the current and future socio-economic needs of the nation (UNESCO-UNEVOC, 2019). Such education seeks to produce trained personnel in applied sciences, technology, and business, particularly at craft, advanced craft, and technical levels, which are essential for agricultural, commercial, and economic development (FGN, 2013; Organization for Economic Co-operation and Development, 2020). Consequently, it becomes imperative that technical education includes comprehensive informational resources regarding career pathways.

A career pathway is defined as a structured series of manageable educational and training steps that lead to industry-aligned skills, licensed credentials, and opportunities for career advancement. These pathways are designed to prepare individuals for employment by providing a clear, sequential progression within a particular industry. Each pathway requires a specific set of qualifications that enables individuals to perform effectively in their respective roles, thus contributing to the development of the national workforce. Academic and career paths furnish valuable insights into career options, job dynamics, and overall career satisfaction, as well as the associated academic training (Săveanu et al., 2023). These frameworks allow trainees and educators to conceptualize employment in the context of career growth, thereby providing enhanced opportunities for individuals in low-wage positions or those with limited skills to access improved employment prospects. For individuals in low-wage jobs or with limited skills to access better employment opportunities, it is essential to support employers in meeting their need for a skilled workforce, thus paving the way for job creation.

Job creation is a crucial aspect of any economic recovery program, especially in the 21st century, considering the social and economic challenges related to employment. Employment provides individuals with income, which can revive and enhance domestic demand for goods and services, thereby stimulating overall economic growth. Additionally, it offers individuals a sense of purpose and significantly contributes to reducing poverty and inequality. Globally, there are 214 million workers living in working poverty, and over 60% of workers are in the informal economy, lacking any form of social protection (Ogundele & Umar, 2020).

To ensure adequate social protection within a formal economy, technical education must focus on emerging job

opportunities. The fastest-growing roles essential for a nation's economy include artificial intelligence and machine learning specialists, sustainability experts, business intelligence analysts, information security specialists, digital communications professionals, research and development specialists, information technology experts, and renewable energy technicians. This necessitates investing in human capital to prepare workers for the changing job market by developing robust technical education programs that equip the workforce with the necessary skills for national development. National development is a complex and vital process that requires a multifaceted approach to achieve significant growth and progress. A country that prioritises poverty reduction, economic growth, job creation, and the development of human resources will experience considerable social, technological, and physical advancements.

Statement of the Problem

The 21st century presents numerous challenges; however, it also offers substantial opportunities for growth and development, as it is possible to create a knowledge-based, egalitarian society that raises the standard of living. Achieving this requires a focus on technical education skills, youth employment, and consistent efforts to provide decent jobs for young people. Despite the challenges, there is an opportunity to create a better future through technical education aimed at job creation. To address these emerging issues, it is essential to provide guidance on career pathways that promote job creation through technical education.

Purpose of the Study

The purpose of this study is to examine career pathways and job creation in the 21st century as key issues in technical education for national development. Specifically, the study aims to:

1. Determine the impact of career pathways on national development.
2. Examine the influence of job creation on national development

Research Questions

In order to achieve the objectives of this study, the following research questions have been developed to direct our investigation:

1. How does the level of career pathways contribute to national development?
2. To what extent does job creation influence national development?

Research Hypotheses

To guide the study, the following null hypotheses were postulated:

Ho_1: There is no significant relationship between career pathway and national development
Ho_2: There is no significant relationship between job creation and national development.

Methodology

The study employed a survey research design to investigate the issues of career pathways and job creation in the 21st century as they pertain to technical education and national development. A purposive sampling technique was used to select the study areas, which included Kwara State College of Education, Ilorin, and Kwara State College of Education (Technical), Lafiagi, both of which have a strong concentration of technical education programs. The total population for the study comprised 80 respondents, including 20 lecturers and 60 students, evenly selected across the study areas. This

is because of the inadequate number of staffs and students offering technical education programme in the areas of study. Data was collected using a 12-item questionnaire structured on a 4-point scale response option.

The questionnaire aimed to gauge the degree to which respondents agreed with each item, with response options including Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). The questionnaire was validated by three experts in Technical Education from the Federal University of Technology, Minna, the Technical Education Department of College of Education, Minna, and the Industrial Training Fund, Ilorin. The weighted mean and standard deviation (SD) were used to answer the research questions, while the hypotheses were tested at a 0.05 significance level. For hypothesis testing, the calculated t-test value was compared against the t-table value; the null hypotheses were accepted if the calculated t-test value was less than the t-critical value. Otherwise, the null hypotheses were rejected. The t-table value of the t-test was 1.98 at $P<0.05$.

Results

Research questions one and two were analyzed using mean and standard deviation and a cut-off point of 2.50 was considered. For the case of interpretation, level of career pathway and job creation on National Development in Nigeria were interpreted as: 3.25 to 4.00 for Good, 2.50 to 3.24 for Fair, and < 2.49 for Poor.

Research Question One: How does the level of career pathways contribute to national development?

Table 1. Mean ratings on the level of career pathway contribution to national development

S/N Items	$\bar{X}$	Std. Deviation	Decision
1 Career pathways prepare individuals for employment with a clear trajectory toward advanced education and training.	2.77	0.69	Fair
2 There is typically information available on career pathways within various industries, supported by data from research sources.	2.45	0.91	Poor
3 Each type of career path encompasses a specific set of qualifications that enable individuals to perform targeted roles for national development.	2.68	0.70	Fair
4 Lecturers assume responsibility for elucidating diverse occupations and the pathways leading to those careers.	2.64	0.73	Fair
Cluster Mean	2.64	0.76	Fair

Table 1 presents a detailed analysis of various career pathways linked to employment, highlighting the structured trajectories available for advancing education and training. This aspect achieved a cluster mean score of 2.77, indicating a moderate level of satisfaction among respondents. Additionally, the qualifications deemed necessary for individuals to thrive in their respective roles, which are pivotal for contributing to national development, received a mean score of 2.68. This suggests that while there is a recognition of the importance of specific qualifications, there may still be gaps in the perceived adequacy of these educational credentials.

Furthermore, the responsibility of lecturers to elucidate the different occupations available and the corresponding pathways leading to these careers garnered a cluster mean score of 2.64. This score, although indicative of fair acknowledgment, highlights a critical area for development in enhancing guidance and support for students navigating their career choices. In stark contrast, the accessibility of information regarding industry-specific career pathways,

bolstered by robust and credible research data, only registered a cluster mean of 2.45. This notably low score reflects a significant deficiency in the availability of accurate and comprehensive information, suggesting that individuals may struggle to make informed decisions about their career options. Overall, the grand mean of 2.64 implies that respondents generally perceive the adequacy of career pathways related to national development as fair. However, this also underscores a pressing need for substantial improvements across these domains to better support individuals in their career development efforts.

Research Question Two: To what extent does job creation influence national development?

Table 2. Mean ratings on the level of job creation on National Development in Nigeria

Job Creation			
S/N Items	$\bar{X}$	Std. Deviation	Decision
1 Students possess knowledge regarding courses that can generate employment opportunities for national development	2.5	60.82	Fair
2 Students are encouraged to pursue job creation upon graduation.	2.6	80.70	Fair
3 Lecturers are designated to mentor students in the domain of job creation.	2.3	40.99	Poor
4 Technical education courses are specifically designed to facilitate job creation.	3.36	0.88	Good
Cluster Mean	2.74	0.85	Fair

Table 2 provides a comprehensive overview of the varying levels of awareness and support regarding courses designed to foster employment for national development. The data reveals that awareness of these courses garnered a cluster mean score of 2.56, suggesting a fair understanding among stakeholders of the opportunities available. In addition, the encouragement of students to actively pursue job creation upon graduation received a slightly higher rating, with a cluster mean of 2.68, also falling within the fair category. However, the effectiveness of assigning lecturers to mentor students in job creation initiatives received notably poorer feedback, reflected in a cluster mean score of 2.34. This indicates a significant gap in mentorship practices that could support students in their entrepreneurial endeavors. The absence of mentorship from lecturers can adversely affect students' career preparation and job placement; conversely, effective mentoring can significantly enhance networking opportunities, provide industry insights, and develop practical skills. Conversely, technical education courses specifically designed with a strong emphasis on job creation performed impressively, achieving a commendable cluster mean score of 3.36. This score highlights the potential effectiveness of these programs in equipping students with the necessary skills for successful job creation. Overall, the grand mean score of 2.74 suggests that while the current level of support for job creation initiatives is fair, there is a crucial need for substantial improvements and enhancements to bolster these efforts further. Addressing the identified shortcomings, particularly in mentoring, could play a vital role in fostering a more robust job creation ecosystem.

Hypotheses Testing

Ho_1: There is no significant relationship between career pathways and national development.

Table 3. The correlation coefficient between career pathway and national development.

Variables	Mean	SD	Df	Cal.r-value	Crit.t-value	p-value	Decision
Career pathways	22.83	7.87					
National Development	38.22	13.38	1408	0.283	0.062	0.001	Ho_1 rejected

P < .05 level of significance

As indicated in Table 3, the analysis reveals a statistically significant result at the p<.05 level of significance. Specifically,

the calculated p-value of 0.001 is substantially lower than the level of significance of 0.05, which supports the rejection of the null hypothesis. This finding suggests that there is a meaningful and significant relationship between career pathways and national development in Nigeria. The correlation coefficient, denoted as r = 0.283, further underscores this relationship, indicating a moderate positive correlation. This suggests that as the diversity and progression within career pathways increase, there is a corresponding positive impact on the overall development of the nation.

Ho_2: There is no significant relationship between job creation and national development

Table 4. The correlation coefficient between job creation and national development.

Variables	Mean	SD	Df	Cal.r-value	Crit.t-value	p-value	Decision
Job creation	26.03	8.15					
National Development	38.22	13.38	1408	0.338	0.062	0.001	Ho_2 rejected

P < .05 level of significance

As detailed in Table 4, the analysis reveals a p-value of 0.001, which is significantly lower than the level of significance of 0.05, with degrees of freedom totaling 1408. This statistical evidence allows us to confidently reject the null hypothesis, indicating a significant relationship between job creation and national development in Nigeria. The correlation coefficient of r = 0.338 further underscores this relationship, suggesting a moderate positive association between the two variables. These findings underscore the critical role that job creation plays in fostering overall national development within the Nigerian context.

Discussion of Findings

The results of the first hypothesis reveal a statistically significant correlation between career pathways and national development, with a correlation coefficient of r = 0.283 ($p < 0.05$). This finding underscores the necessity of adopting a holistic approach to enhancing career pathways. To achieve this, a comprehensive review of existing job requirements is imperative to ensure they align with the evolving demands of contemporary sectors, particularly those driven by advancements in artificial intelligence and machine learning. This alignment is crucial not only for workforce readiness but also for fostering innovation and economic growth.

Furthermore, the findings from the second hypothesis indicate a robust relationship between job creation and national development in Nigeria, as evidenced by a correlation coefficient of r = 0.338 ($p < 0.05$). This significant relationship highlights the critical role that job creation plays in achieving national development goals. The correlation suggests that increased job creation is directly linked to improvements in the quality of life for individuals and families, which is instrumental in reducing poverty levels. This aligns with the perspectives presented by Mensah (2019), who articulated the vital connection between job creation and poverty alleviation. Thus, these findings reinforce the importance of

strategic investments in job creation initiatives as a pathway to not only economic stability but also social progress.

Conclusion

The evidence presented highlights the substantial and multifaceted relationships between career pathways and job creation, especially within the context of national development in Nigeria. It is crucial for policymakers and stakeholders to actively pursue further advancements in these areas to foster sustainable economic growth. To achieve this, there must be a concerted effort to prioritize initiatives and programs that enhance technical education and clearly defined career pathways. Such a focus is essential for generating improved job opportunities for Nigeria's youth, who represent a significant demographic in the nation's labor force. Investing in human capital is vital for equipping the workforce with the skills necessary to handle the evolving demands of the job market. This includes fostering a culture of entrepreneurship and innovation, which can drive economic expansion and resilience. By creating integrated educational frameworks that align with industry needs, alongside mentorship and support programs for young entrepreneurs, Nigeria can lay the foundation for a robust and adaptive workforce capable of tackling future challenges.

Recommendations

In light of the study's findings, the following recommendations are proposed:

1. Policymakers and stakeholders should implement comprehensive initiatives that promote technical education and detailed career pathways, thus enhancing employment opportunities for youth and fostering national development. This includes creating partnerships between educational institutions and industries to ensure that curricula align with the skills demanded by the job market.
2. The government, in collaboration with relevant organisations, must proactively prepare the workforce to adapt to evolving job market dynamics. This can be achieved by providing training programs focused on emerging technologies and market trends, encouraging entrepreneurial ventures through accessible funding and mentorship, and driving economic progress to create a robust and resilient economy.
3. There should be a substantial increase in focus on technical education programs specifically designed to arm individuals with the essential skills necessary for job creation. Investing in these educational frameworks will not only contribute to sustainable economic growth and development in Nigeria but also ensure that the workforce is well-equipped to meet the demands of a rapidly changing global economy.

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EXPLORING ADAPTIVE LEARNING PLATFORMS THAT TAILOR CONTENT TO INDIVIDUAL LEARNERS' NEEDS FOR MORE EFFECTIVE SKILLS ACQUISITION IN GOVERNMENT TECHNICAL COLLEGE IN OYO STATE

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ABSTRACT

This study explores the effectiveness of adaptive learning platforms that tailor content to individual learners' needs for more efficient skills acquisition. The research focuses on a population comprising Management, Teachers, and Students of Government Technical Colleges in Oyo State, Nigeria. A descriptive survey research design was employed for the study. 50 respondents were selected through random sampling technique. Structured questionnaire was designed to capture respondents' views on the use of adaptive platforms in education. The questionnaire was validated by experts in Vocational and Technical Education (VTE). A reliability 0.86 Cronbach Alpha coefficient was obtained after trial testing of the instrument for data collection. Mean, and standard deviation were applied as statistical tools to analyze the responses. The findings revealed a generally positive perception of adaptive learning platforms, particularly in terms of their effectiveness and impact on skill acquisition; viewed as beneficial to a broad range of learners, not limited to those with special needs; the notion that adaptive learning platforms effectively promote lifelong learning in Vocational and Technical Education (VTE) was largely rejected. The recommendations were that: Adaptive learning platforms should be refined to better align with Sustainable Development Goals (SDGs) in VTE by integrating elements that support lifelong learning; Enhancing Support for VTE to increase focus on practical applications that are tailored to the specific needs of VTE programs to ensure they contribute to workforce development effectively among others.

Keywords: **Adaptive Learning, Individual Learners' Needs and Skills Acquisition.**

Introduction

The rapid evolution of technology in education has given rise to adaptive learning platforms intelligent systems designed to provide personalized learning experiences. These platforms leverage artificial intelligence (AI) and data analytics to assess learners' needs, preferences, and progress, enabling tailored content delivery. Unlike traditional, one-size-fits-all teaching methods, adaptive learning platforms focus on catering to the individual learning styles and paces of students, making education more efficient and engaging. By using real-time data, these systems continuously adjust and optimize the learning process, providing learners with content that meets their specific needs. This innovative approach has gained significant attention as educators and policymakers seek solutions to improve the quality and accessibility of education worldwide.

Adaptive learning platforms hold particular promise for vocational and technical education (VTE), a sector that plays a critical role in equipping individuals with the skills and competencies needed for employment and entrepreneurship. VTE programs often focus on practical, hands-on skills that require personalized attention and practice, making them an ideal setting for the implementation of adaptive learning technologies. These platforms can simulate real-world scenarios, provide instant feedback, and identify areas where learners need improvement. Moreover, they can help bridge the gap between theoretical knowledge and practical application, ensuring that students are well-prepared for the demands of the workforce.

The integration of adaptive learning in VTE also aligns with the broader goals of sustainable development. By promoting equitable access to quality education and lifelong learning opportunities, adaptive learning platforms can contribute to reducing inequalities and fostering economic growth. For instance, these platforms can make education more accessible to marginalized populations, such as those in remote areas or with limited resources. By enabling learners to progress at their own pace, adaptive learning technologies can help reduce dropout rates and ensure that more individuals complete their education with the skills they need to succeed.

This research aims to explore the effectiveness of adaptive learning platforms in VTE, focusing on their ability to enhance skills acquisition and foster sustainable development. Specifically, it seeks to examine how these platforms can address the unique challenges faced by VTE programs, such as the need for personalized instruction, the integration of technology in hands-on training, and the alignment of educational outcomes with industry demands. Additionally, this study will investigate the role of adaptive learning in promoting inclusivity and accessibility, ensuring that no learner is left behind in the pursuit of education and economic opportunities.

Purpose of the study

Specifically the research aims to:

1. determine how the ban on Styrofoam plastic food packaging affects consumer's food choices and preferences.
2. examine the impact of the ban of Styrofoam food packaging on consumers' food choices, preferences, and behaviors.
3. Analyze consumers' perceptions of the environmental and health benefits associated with the ban of Styrofoam food packaging.

Research Questions

1. How has the ban on Styrofoam plastic food packaging affects consumer's food choices and preferences?

2. What is the impact of the ban on Styrofoam food plastic packaging on consumers' food choice, preference and behaviors?
3. What are the consumers' perception of the environment and health benefits associated with the ban of Styrofoam food packaging?

Research Hypothesis

The following research hypothesis were formulated ;

1. There is no significant difference between consumers' food choices, preferences shifted towards more sustainable options and post-ban on plastic food packaging.
2. There is no significant difference between how consumers perceive the ban on plastic packaging and positive impact on environmental conservation efforts.

Methodology

The study used a descriptive survey research design to achieve its objectives. A survey design was chosen because it allows for the collection of data from a large sample size, which can be generalized to the population. The target population of this study includes Unilag students and vendors who purchase and use food packs in Lagos, Nigeria. A sample size of 50 consumers was selected using a convenience sampling technique. A structured questionnaire was used to collect data from the respondents; respondents completed the questionnaire designed by the researcher in order to obtain information on the research topic. The questionnaire consisted of three sections: demographic information, awareness and knowledge of styrofoam ban, perceptions of healthy well-being, and opinions on the ban. The structured questionnaire was validated by two experts, one a lecturer in the department of Technology and Vocational Education university of Lagos and the other expert from Lagos State ministry of Health for corrections and amendments to establish the face and content validity. To ensure the reliability of the instrument, the questionnaire was developed based on a thorough review of existing literature and expert opinions, ensuring that the questions accurately measure consumers' perceptions of the ban on styrofoam food packs. The questionnaire was pilot-tested with a small group of respondents different from the sampled respondents and a reliability score of 0.82 was attained using Cronbach Alpha. The respondents were given insight on what the questionnaire was about and the need for them to answer the questions objectively. The respondents' permissions had been sought before the researcher took the questionnaire to them with the help of one research assistant. The respondents were given enough time to respond to the questionnaires. The questionnaires were collected immediately from the respondents. Descriptive statistics: Frequencies, percentages, means, and standard deviations were used to analyse the research questions. Inferential statistics: Correlation analysis was used to examine the relationships between variables.

Results

Research Question 1: How has the ban on styrofoam plastic food packaging affects consumer's food choices and preferences?

Table 1:

Styrofoam ban on consumer food choices and preferences provides insightful findings on the effects of the policy

S/N	Items	Mean	Remark
1	The ban on styrofoam food packaging has made me choose different restaurants or food outlets	2.25	Rejected
2	I now prefer restaurants that use environmentally friendly packaging	2.99	Accepted
3	My food choices have been significantly influenced by the ban on Styrofoam packaging.	2.23	Rejected
4	I have noticed a change in the taste or quality of food since the ban on Styrofoam packaging	2.02	Rejected
5	The ban on styrofoam packaging has made me more conscious of the packaging used by food vendors.	2.99	Accepted
6	I am willing to pay more for food packaged in sustainable materials.	2.92	Accepted
7	The ban on styrofoam has made me reduce my overall consumption of takeout food.	2.44	Rejected
8	I avoid food outlets that still use non-sustainable packaging.	2.72	Accepted
9	I have switched to cooking at home more often since the ban on Styrofoam packaging.	2.67	Accepted
10	The ban on styrofoam packaging has had no impact on my food choices or preferences	2.69	Accepted

The data presented in Table 1 on the impact of the styrofoam ban on consumer food choices and preferences provides insightful findings on the effects of the policy. The respondents' mean scores reveal a varied impact of the styrofoam ban on their food-related behaviors. Most notably, the respondents expressed acceptance towards preferring restaurants that use environmentally friendly packaging, as reflected in a mean score of 2.99. This suggests a positive shift in preference towards sustainable practices in food packaging. Similarly, the mean score of 2.99 for increased consciousness about packaging used by food vendors supports this trend, indicating that the ban has heightened awareness about environmental issues related to food packaging. On the other hand, the mean scores for several items indicate less significant effects. For instance, the mean score of 2.25 for choosing different restaurants due to the ban, along with 2.23 for significant influence on food choices, points to a rejection of these impacts. This suggests that the ban has not substantially altered consumers' restaurant choices or food preferences overall. The respondents also showed a willingness to pay more for food packaged in sustainable materials, with a mean score of 2.92, indicating that while there is some financial willingness to support eco-friendly practices, it is not overwhelmingly high. Similarly, the mean score of 2.67 for switching to cooking at home more often and 2.44 for reducing overall takeout consumption reflect a moderate acceptance of changes in consumption patterns due to the ban. The lowest mean score of 2.02 for noticing changes in taste or quality of food since the ban suggests that the ban has had minimal impact on perceived food quality, and the mean score of 2.69 for the overall impact on food choices and preferences indicates that many respondents feel the ban has had little effect on their food habits. Overall, while there is some evidence of increased awareness and preference for environmentally friendly packaging, the ban on styrofoam has not significantly influenced many aspects of consumer food choices and preferences. This highlights a need for continued efforts to better align consumer behaviors with sustainability goals.

Research Question 2: What is the impact of the ban on styrofoam food plastic packaging on consumers' food choice, preference and behaviors?

Table 2:
The impact of the ban on styrofoam food plastic packaging on consumers' food choice, preference and behaviors

S/N	Items	Mean	Remark
1	The ban on styrofoam packaging has made me more environmentally conscious in my food choice	2.8	Accepted
2	I prefer to buy food from outlets that advertise sustainable packaging options.	2.8	Accepted
3	I actively seek out information about the packaging practices of food vendors.	2.7	Accepted
4	I feel that the quality of food packaging has improved since the ban on Styrofoam	2.9	Accepted
5	I am more likely to dine in at restaurants rather than take out due to the ban on styrofoam.	2.5	Accepted
6	The ban on styrofoam packaging has had no impact on my behavior as a consumer.	2.5	Accepted
7	The ban on styrofoam packaging has influenced my decision to eat out less frequently.	2.4	Rejected
8	I believe the ban on styrofoam has positively impacted my health.	2.6	Accepted

The data presented in Table 2 on the impact of the ban on styrofoam food plastic packaging reveals several insights into how this policy has influenced consumer behaviors and preferences. The respondents' mean scores indicate varying degrees of acceptance and impact across different areas. A mean score of 2.84 for becoming more environmentally conscious in food choices suggests that the ban has moderately encouraged respondents to consider environmental factors when selecting their food. Similarly, a mean score of 2.86 for preferring food outlets that advertise sustainable packaging options indicates that many respondents are inclined towards establishments that highlight their commitment to eco-friendly practices. The mean score of 2.70 for actively seeking information about food vendors' packaging practices shows that while there is some effort among respondents to gather information about sustainability, it is not overwhelmingly high. This is further supported by the mean score of 2.96, which reflects a general belief that the quality of food packaging has improved since the ban, indicating a positive perception of the changes brought about by the policy. Respondents also expressed a moderate inclination to dine in at restaurants rather than opt for takeout, with a mean score of 2.54. This suggests that the ban has had some influence on dining preferences, although the effect is not strong. Conversely, the mean score of 2.45 for reduced frequency of eating out, and the score of 2.59 for perceived lack of impact on consumer behavior, reflect a rejection of significant behavioral changes linked to the ban. The mean score of 2.69 for believing that the ban has positively impacted health indicates that while some respondents view the ban as beneficial for their health, the overall impact is modest. The findings indicate that while the ban on styrofoam packaging has led to some positive changes in environmental consciousness and preferences for sustainable packaging, its impact on broader consumer behaviors and health perceptions is relatively moderate. This highlights the need for continued efforts to enhance the effectiveness of such policies and further align consumer practices with sustainability goals.

Research Question 3: What are the consumers' perception of the environment and health benefits associated with the ban of styrofoam food packaging ?

Table 3:

Consumers' perception of the environment and health benefits associated with the ban of styrofoam food packaging

S/N	Items	Mean	Remark
1	I believe the ban on styrofoam packaging is beneficial for the environment.	3.4	Accepted
2	I find alternative packaging materials less convenient than styrofoam.	2.4	Rejected
3	I feel that the ban on styrofoam packaging will lead to better health outcomes.	3.3	Accepted
4	The ban on styrofoam packaging has made me more aware of the environmental impact of my food choices.	3.1	Accepted
5	I support the ban on styrofoam packaging because of its potential health benefits.	3.2	Accepted
6	The environmental benefits of banning styrofoam outweigh any inconvenience it may cause.	3.2	Accepted
7	I do not perceive any health benefits from the ban on styrofoam packaging.	2.0	Rejected

The data presented in Table 3 on consumers' perceptions of the environmental and health benefits associated with the ban on styrofoam food packaging provides a comprehensive view of respondents' attitudes toward the policy. The mean scores reflect varying degrees of agreement or disagreement across different items. A mean score of 3.44 for believing that the ban on styrofoam packaging is beneficial for the environment indicates strong support for the environmental advantages of the policy. This high score suggests that respondents broadly recognize and accept the environmental benefits of banning styrofoam. In contrast, the mean score of 2.42 for finding alternative packaging materials less convenient than styrofoam reveals a general disagreement with this sentiment. This suggests that, for the majority, alternative packaging materials are not perceived as significantly less convenient than styrofoam. The mean score of 3.31 for the belief that the ban will lead to better health outcomes reflects a positive view of the health benefits associated with the ban. Respondents generally accept that the policy may contribute to improved health outcomes. A mean score of 3.10 for increased awareness of the environmental impact of food choices shows that the ban has moderately raised respondents' awareness about the environmental implications of their food packaging choices. Support for the ban due to its potential health benefits is evidenced by a mean score of 3.27, indicating that many respondents back the ban primarily because they perceive it to have health advantages. The mean score of 3.29 for the belief that the environmental benefits of banning styrofoam outweigh any inconvenience suggests that respondents generally believe that the positive environmental impact justifies any inconvenience caused by the ban. Conversely, the mean score of 2.09 for not perceiving any health benefits from the ban shows a significant level of disagreement with the notion that the ban does not offer health benefits. This lower score suggests that a substantial portion of respondents do not share this view, and they are likely to perceive health benefits from the ban. The findings reveal a strong consensus on the environmental benefits of the ban and moderate support for its health benefits. However, perceptions of inconvenience and the specific health impacts remain less clear, with some respondents expressing concerns or doubts about these aspects.

$H0_1$: There is no significant difference between Consumers' food choices, preferences shifted towards more sustainable options and post-ban on plastic food packaging.

Table 4: Consumers' food choices, preferences shifted towards more sustainable options and post-ban on plastic food packaging

Chi-Square	67.590[a]
df	2
Asymp. Sig.	.000

Research Hypothesis 1, which asserts that consumers' food choices and preferences have shifted towards more sustainable options following the ban on plastic food packaging, the Chi-Square test results reveal a Chi-Square value of 67.590 with 2 degrees of freedom. The p-value is .000. This result indicates a statistically significant association between the ban on plastic food packaging and changes in consumer food choices and preferences. The Chi-Square value is notably high, and the p-value is well below the conventional significance level of 0.05. This suggests a strong rejection of the null hypothesis, demonstrating a meaningful shift towards more sustainable food options. The significant p-value supports the notion that the ban has effectively influenced consumer behavior, leading to a notable preference for sustainable alternatives. In summary, the Chi-Square test confirms that consumers' food choices and preferences have indeed shifted towards more sustainable options as a result of the plastic food packaging ban.

HO_2: There is no significant difference between how consumers perceive the ban on plastic packaging and positive impact on environmental conservation efforts.

Table 5: consumers perceive the ban on plastic packaging and positive impact on environmental conservation efforts

Chi-Square	47.651
df	4
Asymp. Sig.	.001

For Research Hypothesis 2, which posits that consumers perceive the ban on plastic packaging as positively impacting environmental conservation efforts, the Chi-Square test results show a Chi-Square value of 47.651 with 4 degrees of freedom. The p-value (Asymp. Sig.) is .001. This result indicates a statistically significant association between consumer perceptions of the plastic packaging ban and its impact on environmental conservation. The Chi-Square value is substantial, and the p-value is well below the conventional significance level of 0.05, suggesting a strong rejection of the null hypothesis. The significant p-value implies that there is a meaningful relationship between the ban on plastic packaging and consumers' views on its environmental benefits. Consumers' perceptions align with the hypothesis that the ban contributes positively to environmental conservation efforts. The Chi-Square test confirms that consumers generally perceive the ban on plastic packaging as beneficial for environmental conservation. This suggests widespread agreement among consumers that the ban supports environmental goals, highlighting the effectiveness of such policies in promoting environmental sustainability.

Discussion of Findings

The data shows that while there is evidence of increased acceptance of environmentally friendly packaging and heightened awareness about the environmental issues related to food packaging, the overall impact on restaurant choices and food quality perception is moderate. Respondents express a shift towards preferring restaurants with sustainable practices and a slight willingness to adjust consumption patterns, but the influence on broader food-related behaviors is not as

significant. This is in line with previous research by Food and Agriculture Organization or the United Nation (2020), who found that while awareness and preference for sustainable practices are growing, the influence on broader consumer behaviors, including dining choices and quality perception, can be limited. Olatubosun O. & Dawudu O. **(2023)** support this view, noting that consumer adoption of sustainable packaging often shows increased awareness but does not always translate into drastic changes in all aspects of food consumption. The moderate impact observed in this study reflects these findings, suggesting that while consumers are becoming more conscious, the overall changes in behavior may not be uniformly strong. The findings by indicating that the ban has led to a noticeable shift towards more sustainable food packaging options. This is aligned with the data, which shows a positive trend in consumer preferences for environmentally friendly practices. However, the moderate impact on overall food choices and quality perception reflects that while awareness and preference have increased, the ban has not drastically altered all aspects of consumer behavior. The impact of the ban on consumers' food choices, preferences, and behaviors. The analysis shows a moderate increase in environmental consciousness and preference for sustainable packaging among consumers. While there is some positive change in dining preferences and perceptions of food quality, the overall impact on eating out frequency and health perceptions is relatively modest. The analysis shows a moderate increase in environmental consciousness and preference for sustainable packaging.

Abusomwan (2020) similarly report that while there is some positive change in consumer preferences and perceptions related to sustainable practices, the overall impact on eating out frequency and health perceptions is moderate. This is echoed by Nigeria Environmental Protection Agency (2024), who found that environmental consciousness can influence specific food-related behaviors, but the impact varies across different consumer segments. The findings align with the hypothesis that the ban leads to some behavioral changes towards sustainability, though these changes are not uniformly strong across all areas of consumer behavior. This result supports the hypothesis that the ban has led to some changes in consumer behaviors towards sustainability. The moderate impact observed in the data indicates that while there is some shift towards environmentally conscious practices, it is not uniformly strong across all areas of consumer behavior. This suggests that the ban has influenced certain aspects of consumer choices, but the overall effect is more nuanced. Findings from Objective 3 examine consumer perceptions of the environmental and health benefits associated with the ban on styrofoam packaging. The data reveals strong support for the environmental benefits of the ban, with moderate acceptance of its health benefits. Consumers generally view the ban positively in terms of environmental impact but express mixed feelings about the specific health benefits and potential inconvenience. News Agency of Nigeria (2024) found similar results, with strong consumer support for the environmental benefits of bans on single-use plastics, but more mixed opinions regarding health benefits. Bolarinwa, (2023) also note that while environmental benefits are generally recognized and valued, perceptions regarding health impacts can be less clear and more variable. The discussion reflects how the findings align with the hypotheses, demonstrating the impact of the styrofoam ban on consumer behaviors and perceptions. The observed relationships between sustainability, consumer choices, and the role of education underscore the importance of understanding these dynamics in promoting effective environmental policies and consumer practices.

Conclusion

The study aimed to investigate consumer perceptions of the ban on styrofoam food packaging, focusing on its implications for health and well-being. The research has revealed several key insights into how this regulatory measure is perceived and its impact on consumer behavior and attitudes. The findings indicate that the ban on styrofoam food packaging has led to a noticeable shift in consumer preferences towards more sustainable packaging options. Consumers have shown

increased acceptance of environmentally friendly practices and heightened awareness of the environmental issues associated with food packaging. Despite this positive trend, the overall impact on restaurant choices and perceptions of food quality remains moderate. While there is a clear inclination towards supporting sustainable practices, the ban has not significantly altered broader food-related behaviors.

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ENTREPRENEURIAL EMPOWERMENT AS PANACEA FOR GRADUATES ECONOMIC ENGAGEMENT IN SOUTHWEST NIGERIA

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ABSTRACT

The study examined entrepreneurial empowerment as panacea for graduates' economic engagement in Southwest Nigeria. Two research questions guided the study. A descriptive design of correlational type was used as research design in this study. The population comprised graduates of tertiary institutions in Southwest Nigeria. Using purpose sampling technique, only public tertiary institutions were considered. A total of 138 graduates who are currently running their postgraduate studies in University of Ekiti, Ekiti State; Lagos State University, Lagos state; Olabisi Onabanjo University, Ogun State; and Osun State University Osun State were selected as sample size of the study through the use of stratified sampling technique. Researchers developed questionnaire titled: Entrepreneurial Empowerment and Graduates Economic Engagement Questionnaire (EEGEE) was used for data collection with reliability coefficient r = .92. Research question 1 was answered using descriptive statistics of mean, standard deviation and pie-chart. Pearson Product Moment Correlation (PPMC) was used for answering research question 2. The findings of the study revealed that improvement in entrepreneurial intention, entrepreneurial mindset, entrepreneurial behavior, acquired business skills and develop business resilience were among the role of entrepreneurial empowerment in promoting graduates' economic engagement for economic engagement. There was a relationship between entrepreneurial empowerment and graduates economic engagement (r = 0.338, p <.05). Government through institutions, should as a matter of urgency improve the quality of teaching and learning entrepreneurship education and provide the needed quality assurance in terms of personnel to handle the course with the hope of equipping students with needed skills for entrepreneurial empowerment.

Keywords: **Entrepreneurial Empowerment, Economic Engagement, Graduates**

Introduction

Economic engagement has been part of the goals every nation is seeking to achieved for prosperity in the country. The ability and capability to remain in work activities or to gainfully employed or self-employed is a concept surrounding economic engagement to eradicate the circumstances promoting unemployment features among graduates in Nigeria. Economic engagement in this study entailed the instances where university graduates productively involved in economic activities of the country; that is, the process whereby graduates legally commercialized the skills and knowledge acquired while in the school to make a living. This could take the forms of ability to be economically self-reliant and manage owned business; so that the numbers of graduates' unemployment could be reduced. Economic engagement of university graduates further mean impetus towards the attainment of sustainable economic development variables such as reduction in unemployment, reduction in poverty, increases in standard of living among others.

Essang, Olusola and Adenugba (2024) buttressed this point by reiterating that one of the antidotes today graduates can utilize to solve the issues facing them in labour market is ability to solely engage in economic activities rather than looking for non-available white-collar job. They also reiterated that the numbers of graduates who are waiting for white-collar-job are far greater than the available job vacant in private and public sectors. This scenarios among the factors increases numbers of graduates' unemployment in Nigeria. Nwosu and Chukwudi (2018) lamented that the failure of university graduates to venture into self-business development rather than waiting to secure white-collar job is a great issue facing their economic engagement while Seiyaibo (2020) believed that graduates failure to venture into economic engagement through establishment of small business could be unrelated to the lack of entrepreneurial skills and knowledge as well as the problems facing the Nigeria economy and lack of investible funds.

According to Ambali, Olawuni, Sholagberu and Mohammed (2022), the failure of graduates of tertiary institutions in Nigeria to secure white collar-job have given rise to high unemployment in the country and consequently to be among drivers of insecurity issues facing the country. Egbeyemi, Enilolobo and Babayemi (2023) supported this view by stipulating that increases in poverty level among graduates could be tagged to their long years of not been employed or of not been able to serve as agent for economic engagement. That is, about more than average numbers of graduates every year fell into the circle of unemployment and poverty; this ugly circumstance can easily be traced to the quality of education they received while in institutions. This issue bordered the government and other stakeholders in the economy to concluded that these graduates seems to be lacking entrepreneurial nature in their various disciplines and introduced Entrepreneurship Education as compulsory subjects to be done by all set of undergraduates with the aim to train them on how to commercialize their skills for economic engagement should white collar-job not available and eradicate the syndromes of unemployment in our country.

Entrepreneurship education is an education that trained and equipped recipients with vocational training and the ability to commercialize skills for making a living. Fems, Opigo, Agada and George (2020) opined that one of the reasons for entrepreneurship education introduction into tertiary institutions curriculum is to train and develop entrepreneurial empowerment of recipients, so that, their capability to venture or engage in self-economic activities for sustenance would not have resulted to unemployment. They also saw entrepreneurial empowerment as the steps of promoting undergraduates or graduates' ability, mindset, intentions, and steadfastness for engagement into business activities. That is, the process of training that exposed students or graduates' eyes to the rudiments of being economically self-reliance and acquisition of necessary skills to achieved such goal.

Entrepreneurial empowerment is the process of unlocking potential in wealth creation and opportunities towards the attainment of economic development and this has been part of the reasons entrepreneurship education is made compulsory

subject in today institutions of learning in Nigeria with the aim to enhance graduates' economic engagement. So that, the issues of graduates' unemployment and poverty could be dealt drastically. Having skills in entrepreneurial empowerment could promote graduates' ability to think and behave like entrepreneurs', exercises entrepreneur attitude and behavior that have potential in enhancing they're of business innovation and production of novel business ideas that can cumulate into venture creation, increases in numbers of job creation and consequently poverty reduction (Agwu, Onwuegbuzie & Ezeifeka, 2017). Entrepreneurial empowerment builds initiatives skills and knowledge on how best to approach new business development and study the environment against external factors that might erode sustainability in the long run. In short, entrepreneurial empowerment made graduates' to have indebt knowledge to venture-creation, more economic opportunities, exposure to understand where business opportunities can be developed as well as ability to survey business environment (Fudamu, Augustine & Kwabe, 2024).

Statement of the Problem

On a yearly basis, there have been increase in graduates' unemployment in Nigeria and this might among different factors that are fueling high poverty rate, increases in level of crime as well as insecurity of live and property. However, graduates are supposed to be ready-made person that is equipped with relevant skills and knowledge to handle economic, business and social issues that may come before them. In that circumstance, graduate should not be among individuals who will join unemployment figures, who will stay without being employed for years and still looking for job vacant either in public and private organizations. The situation is pathetic and discourages higher education qualifications in our land. One may begin to think that the quality of higher education offered to graduates seems to fall below what the current economic situations needed to transform opportunities to economic engagement and made a living. However, this issue had grown in Nigeria that necessitated the study to examine how to achieved graduates' economic engagement through entrepreneurial empowerment in Southwest

Objectives of the Study

The main objective of the study was to examine entrepreneurial empowerment as panacea for graduates economic engagement in Southwest Nigeria. Specifically, the study seeks to:

1. Ascertain level of graduates' economic engagement.
2. identify the role of entrepreneurial empowerment in promoting graduates' economic engagement.
3. find out the likely relationship between entrepreneurial empowerment and graduates economic engagement.

Research Questions

The following research questions guided this study:

1. What is the level graduates' economic engagement?
2. What are the role of entrepreneurial empowerment in promoting graduates' economic engagement?
3. Is there any relationship between entrepreneurial empowerment and graduates economic engagement?

Methodology

A descriptive design of correlational typed was used as research design in this study. The justification for using this design was that large volume of data are needed for shortest period of time and opinions of graduates as well are required in

answering research questions of the study. The population of this study comprised graduates of tertiary institutions in Southwest Nigeria. Using purpose sampling technique, only public tertiary institutions were considered. A total of 138 graduates who are currently running their postgraduate studies in University of Ekiti, Ekiti State; Lagos state University, Lagos state; Olabisi Onabanjo University, Ogun State; and Osun State University Osun State were selected as sample size of the study through the use of stratified sampling technique. The stratification was based on state type and university. Researchers developed questionnaire titled: Entrepreneurial Empowerment and Graduates Economic Engagement Questionnaire (EEGEE) was used for data collection.

This questionnaire was subdivided into two distinct ways. Sections 1 and 2 embraced demographic features of respondents and questionnaire items solicitating items regarding the role of entrepreneurial empowerment in promoting graduates' economic engagement. The questionnaire was tailored towards four-scales format which happened to be the modification from five Likert scale. However, the questionnaire was validated by three experts from Tai Solarin University of Education, specifically, from Department of Entrepreneurship Education and Test and Measurement. All the corrections raised were amended before subjecting the questionnaire to the reliability testing. 15 copies of the questionnaires were administered among postgraduates of Delta State University and the data collected were subjected to Cronbach Alpha. The reliability coefficient was reported as r = .92. The researchers and three research assistants participated in the study during questionnaire administration. However, these research assistants were trained in the steps and process of meeting the respondents and employed them to attends to questionnaires by allowing them to understands the reasons for the study. However, a total of 138 copies of the questionnaires were distributed for administration and after two weeks, only 129 copies were retrieved. Retrieval rate was 93% and used for analyses. Research questions 1 and 2 were answered using descriptive statistics of mean, standard deviation and pie-chart. Pearson Product Moment Correlation (PPMC) was used for answering research question 3.

Results

Research Question 1: What is the level graduates' economic engagement?

Table 1: Descriptive statistics on the level graduates' economic engagement

Items	Mean	SD	Decisions
I have a personal business.	2.67	1.79	Agreed
Since I graduated, being managing my enterprises	2.48	1.99	Disagreed
I don't believe in engaging in entrepreneurial activities.	2.29	1.84	Agreed
I have the mindset to start self-business.	2.51	1.89	Agreed
I always think forwards on how to improve my enterprises	2.53	1.90	Agreed
Cluster Mean	2.49		

Figure 1: Pie-chart showing the level graduates' economic engagement

Table 1 indicated that cluster mean was also found to be 2.49 which less than the bench mark of 2.50. The implications of this result were that there was low level of graduates' economic engagement.

Research Question 2: What are the role of entrepreneurial empowerment in promoting graduates' economic engagement?

Table 2: Descriptive statistics on the role of entrepreneurial empowerment in promoting graduates' economic engagement

	Items	Mean	SD	Decisions
	Improved entrepreneurial intension	3.18	.938	Agreed
	Enhanced entrepreneurial mindset	3.21	.905	Agreed
	Promoted entrepreneurial behavior	2.99	1.32	Agreed
	Allowed graduates to have acquired business skills	2,67	1.02	Agreed
	Encouraged graduates how to develop business resilience.	2.82	1.97	Agreed
	Cluster Mean	2.97		

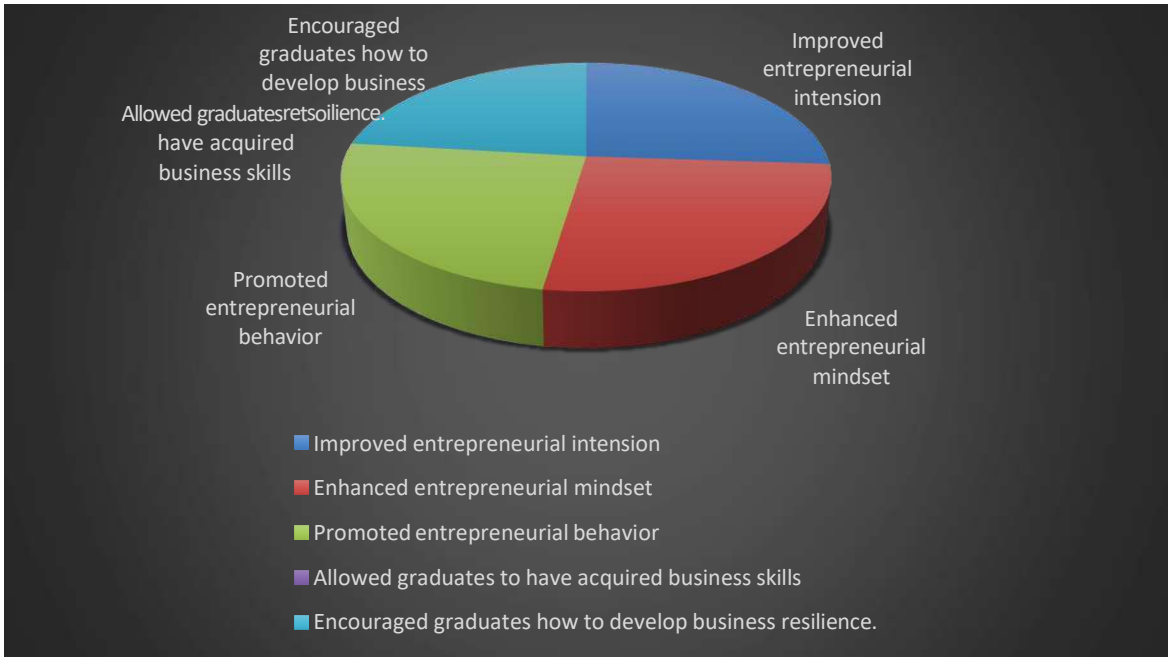

Figure 1: Pie-chart showing role of entrepreneurial empowerment in promoting graduates' economic engagement

Table 2 indicated that improved entrepreneurial intention with the mean value 3.18 > 2.50; entrepreneurial mindset 3.21 > 2.50; entrepreneurial behavior 2.99 > 2.50; acquired business skills 2.67 > 2.50; and develop business resilience 2.82 > 2.50. The cluster mean was also found to be 2.97 which greater than the bench mark of 2.50. The implications of this result were that improvement in entrepreneurial intention, entrepreneurial mindset, entrepreneurial behavior, acquired business skills and develop business resilience were among the role of entrepreneurial empowerment in promoting graduates' economic engagement for economic engagement.

Research Question 3: Is there any relationship between entrepreneurial empowerment and graduates economic engagement?

Table 3: PPMC results on the relationship between entrepreneurial empowerment and graduates economic engagement

Variables	N	Mean	Std. Dev	df	r_{value}	p_{value}
Entrepreneurial empowerment	129	21.28	3.10	3	.338	.001
Economic engagement		16.50	3.06			

From Table 3 it was observed that there was relationship between the independent variable and the dependent variable in the order of (r = 0.338, p <.05). On this premise, the researchers concluded that relationship between entrepreneurial empowerment and graduates' economic engagement.

Discussion of Findings

The findings of the study revealed that there was low level of graduates' economic engagement and that improvement in entrepreneurial intention, entrepreneurial mindset, entrepreneurial behavior, acquired business skills and develop business resilience were among the role of entrepreneurial empowerment in promoting graduates' economic engagement. This implied that entrepreneurship education could promote and made graduates to develop entrepreneurial empowerment for economic engagement so that unemployment can reduced leading to wealth and job creation as well as poverty reduction in Nigeria. It was also revealed that there was relationship between entrepreneurial empowerment and graduates economic engagement. Meaning that the more entrepreneurial empowerment increases, the more graduates enable to participated in economic engagement rather than looking for white-collar job and remained in unemployment circle. These findings were in tandem with Agwu et al (2017) who argued that entrepreneurship education is a vocational training that aid graduates' entrepreneurial empowerment for future benefits. Ambali et al (2022) found that entrepreneurship education enhances entrepreneurial empowerment of university graduates which eventually improved their ability to become employer of labour through venture into business activities. The authors further reiterated that entrepreneurial empowerment are among the economic segments needed for the attainment of sustainable economic development such as job creation, reduction in poverty as well as improved in living standard of graduates. In the opinions of Essang et al (2024), they concluded that acquisition of skills in entrepreneurial intention, mindset and attitudinal dispassion of graduates to become economically self-reliance relied heavy on their level of entrepreneurial engagement. Egbeyemi et al (2023) found that having interest and skills in entrepreneurial intention, entrepreneurial mindset, and entrepreneurial behavior, were strong indicators for graduates economic engagement and drives towards unemployment reduction.

Conclusion

The circumstance surrounding graduates' economic engagement form parts of the goal of developing nations today, Nigeria not excepted; because the issue of graduates' unemployment has been alarming, thus, this study examined entrepreneurial empowerment as antidotes for graduates economic engagement in Southwest Nigeria. The following conclusions were drawn based on the findings of the study that improvement in entrepreneurial intention, entrepreneurial mindset, entrepreneurial behavior, acquired business skills and develop business resilience were among the role of entrepreneurial empowerment in promoting graduates' economic engagement. It was also revealed that there was relationship between entrepreneurial empowerment and graduates economic engagement. Meaning that the more entrepreneurial empowerment increases, the more graduates enable to participated in economic engagement rather than looking for white-collar job and remained in unemployment circle.

Recommendations

The following recommendations were raised for the study:

1. Government through institutions authority should as a matter of urgency improved quality of teaching and learning of entrepreneurship education and provided the needed quality assurance in terms of personnel to handle the course with the hope of equipping students with needed skills for entrepreneurial empowerment.
2. The lecturers in charge of entrepreneurship education should be sponsor for capacity-building on how to adopt effective methodology while delivering instruction in entrepreneurship education lecture with the hope to train students on the rudiments of entrepreneurship that can enhance their entrepreneurial empowerment.

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EXAMINING THE IMPACT OF FUNDING SOURCES ON THE SUCCESS, CHALLENGES, AND FUTURE PROSPECTS OF TECHNOLOGY EDUCATION PROGRAMS IN LAGOS STATE, NIGERIA: A MULTI-INSTITUTIONAL ANALYSIS

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ABSTRACT

This comprehensive study investigates the multifaceted impact of diverse funding sources on technology education programs across Lagos State's higher education institutions. Focusing on three primary funding mechanisms - government allocations, private sector investments, and scholarship programs - the research employs an explanatory sequential mixed-methods design to evaluate their differential effects on program success metrics, operational challenges, and long-term sustainability prospects. Quantitative data were systematically collected through a validated Funding Impact on Technology Education Questionnaire (FITEQ) administered to 108 strategically selected respondents (including administrators, faculty, and students) across four representative institutions, achieving a 92% response rate. These were complemented by in-depth, semi-structured interviews with 20 key stakeholders to capture nuanced perspectives. Advanced statistical analysis using chi-square tests ($\alpha = 0.05$) revealed significant patterns: government funding demonstrated strong positive correlation with enhanced infrastructure ($\beta = 0.42$, $p < 0.01$) and curriculum development initiatives; private sector involvement, while improving equipment availability (72% of respondents), introduced complexities in program autonomy ($\chi^2 = 8.33$, $df = 3$); and scholarship programs significantly increased student retention rates ($r = 0.68$) and fostered greater optimism about career prospects among beneficiaries (83% positive responses). Thematic analysis of qualitative data further identified critical mediating factors including institutional governance structures, funding allocation transparency, and industry-academia alignment. These robust findings provide an evidence base for policymakers to develop balanced funding matrices that optimize resource utilization while maintaining educational quality. The study contributes novel insights to human capital development theory within emerging economies and proposes a conceptual framework for sustainable funding of STEM education in resource-constrained environments.

Keywords: **Challenges, Funding sources, Innovation, Program success, Technology Education.**

Introduction

The 21st century's knowledge-driven economy has elevated technology education to a critical determinant of national competitiveness and sustainable development (World Bank, 2022). Nowhere is this more apparent than in Nigeria, where rapid urbanisation and digital transformation have intensified demand for skilled technical professionals (National Bureau of Statistics, 2023). Lagos State, as the nation's economic and technological epicenter, exemplifies this trend: its ambition to become Africa's premier smart city hinges on robust technology education programs that can produce a future-ready workforce (Lagos State Ministry of Science & Technology, 2023).

Yet, despite this strategic importance, technology education institutions in Lagos face a paradox. While enrollment in programs like computer science, engineering, and renewable energy technology has grown by 22% since 2020 (Tertiary Education Commission, 2023), their effectiveness remains constrained by chronic underfunding. Existing studies (e.g., Omodero, 2023; Oyebode, 2021) have broadly highlighted funding shortages in Nigerian higher education but fail to address a critical gap: how different funding sources—government allocations, private sector investments, and scholarship programs—uniquely shape program outcomes. This oversight is consequential, as each funding mechanism carries distinct implications for institutional autonomy, resource availability, and long-term sustainability (Skrbinjek & Lesjak, 2018).

This study addresses this gap through a multi-institutional investigation of Lagos State's technology education landscape. Focusing on four strategically selected institutions (two public and two private), we examine three underexplored dimensions:

1. **Success Metrics**: How government funding correlates with infrastructure quality, faculty retention, and curriculum relevance;
2. **Challenge Dynamics**: The trade-offs private sector partnerships introduce, including constrained autonomy versus enhanced equipment access;
3. **Future Readiness**: Whether scholarship programs significantly improve graduate employability and stakeholder optimism.

Our mixed-methods approach combines quantitative surveys (n=108) with qualitative interviews (n=20) to capture both statistical patterns and stakeholder narratives. Theoretically, we contribute to human capital development discourse by demonstrating how funding source selection creates divergent educational value chains in emerging economies (Achebe et al., 2022). Practically, our findings equip policymakers with evidence to optimise funding matrices a pressing need given Lagos State's goal to increase STEM graduates by 40% by 2030 (Lagos State Education Policy, 2022). The study's urgency is underscored by global shifts in educational financing. As UNESCO (2023) warns, developing nations risk exacerbating skills gaps if they rely on monolithic funding models. By dissecting Lagos State's complex funding ecosystem, this research offers transferrable insights for similar contexts across Sub-Saharan Africa.

Purpose of the study

1. Compare the impact of government funding, private sector support, and scholarships on technology education program quality.
2. Identify key challenges each funding source creates for institutions, including autonomy and resource limitations.
3. Assess stakeholder confidence in the long-term sustainability of funded programs.

4. Analyze how different funding models affect graduate employability and skills relevance.
5. Propose context-specific strategies to optimize funding mixes for Lagos State's technology education sector.

Research Questions:

1. How does funding from government sources influence the success and effectiveness of technology education programs in Lagos State?
2. What are the contributions and limitations of private sector funding in supporting technology education initiatives within the state?
3. How do scholarships provided to students impact the quality and accessibility of technology education programs in Lagos State?
4. What are the primary challenges and constraints faced by technology education programs due to their reliance on various funding sources?
5. To what extent do stakeholders, including students, educators, and administrators, express optimism and expectations regarding the future sustainability and growth of technology education in Lagos State?

Research Hypothesis

Hypothesis 1: Government Funding and Program Success

Ho1**:** There is no statistically significant association between the level of government funding and the success of technology education programs in Lagos State.

Hypothesis 2: Private Sector Funding and Program Challenges

Ho2: There is no statistically significant relationship between private sector funding and the challenges faced by technology education programs in Lagos State.

Hypothesis 3: Scholarships and Future Prospects

Ho3: There is no statistically significant impact of scholarships on the optimism and expectations for the future sustainability of technology education programs in Lagos State.

Lıterature Revıew

Bamigboye (2016) examines the impact of economic crises on education in the South-West region of Nigeria. The study reveals that economic crises have led to significant budget cuts in education by many State Governments, negatively affecting teachers, students, and families. However, a noteworthy finding is that a few State Governments have recognized the importance of increasing investment in education during economic crises, viewing it as a strategy to address short-term unemployment and safeguard long-term human capital. This research underscores the critical role of well-funded education systems in mitigating economic crises and nurturing the development of creative talents that can contribute to a nation's economic resilience.

Skrbinjek (2018) explores the impact of the global economic crisis on funding for tertiary education in European countries. The study categorizes countries based on the severity of the economic impact and investigates changes in tertiary education funding. Findings reveal that tertiary education was less affected by austerity measures compared to the education sector as a whole. In countries severely affected by the crisis, some reduced public expenditure on tertiary education. Additionally, countries with higher pre-crisis spending increased the share of GDP allocated to tertiary

education more than those with lower pre-crisis spending. This research sheds light on how governments adjusted funding for tertiary education in response to the economic crisis.

Ballatore (2019) provides an overview of an innovative teaching program designed for talented freshmen entering Engineering Bachelor's courses at the Politecnico di Torino, Italy, since 2013. The study outlines the program's structure, year-by-year, emphasizing its dual objectives: reinforcing the standard Engineering curriculum while also incorporating hybrid activities encompassing non-technical domains such as soft-skills, critical thinking, humanities, and creativity. It delves into the strategies and methods used for student selection and justifies the human resource efforts and associated costs undertaken by the University. The research critically analyzes the outcomes of a three-year experience, drawing from structured surveys that collected students' feedback. The results are examined to offer insights for potential implementation and further development of the program.

Alamina (2020) delves into the critical role of education in driving social transformation and economic prosperity within nations, with a particular focus on the Nigerian context. The research laments the unfortunate state of the education sector in Nigeria, attributing its challenges to political leadership issues. These leadership challenges have hindered developmental progress and the identification of core values essential for sustaining economic growth and national development. The study identifies various factors contributing to this state of affairs, including ethnicism and nepotism, political corruption, accountability issues, and the promotion of mediocre individuals to leadership roles. The paper concludes by advocating for inspirational leadership capable of motivating subordinates and emphasizing individual growth and development. It underscores the need for leadership training to equip leaders for their crucial roles, emphasizing that clear vision and focus are prerequisites for organizational growth and development. Additionally, the study recommends adequate funding and equipping of educational institutions to ensure effectiveness, ultimately contributing to national development.

Wint (2021) explores the landscape of Engineering Education Research (EER) within the UK, shedding light on its status and characteristics compared to other countries with a more established presence in this field. The study addresses the lack of information about individuals identifying as engineering education researchers in the UK, their definitions of engineering education research, their target audiences, and the factors influencing their research questions, methodologies, and collaborations. The qualitative research approach involves semi-structured interviews with self- identified engineering education researchers involved in EER in the UK, drawing participants from the UK and Ireland Engineering Education Research Network (EERN). The study's outcomes reveal that EER in the UK is predominantly conducted by intrinsically motivated teaching-focused academics. Research questions often align with personal interests and local contexts, with limited collaboration, especially with external colleagues or education and social science researchers. Dissemination preferences lean toward conferences rather than journals, and there is acknowledgment that UK EER may not yet meet the quality standards required for funding or publication in certain journals. The research highlights a dearth of professional development opportunities, informal mentoring, funding, time allocation, and recognition for EER participation. In conclusion, the study suggests that EER is in the early stages of recognition within the UK, with emerging research agendas and quality criteria signaling progress toward establishing EER as a legitimate research field. Further quantitative investigations are recommended to provide more comprehensive insights and evidence for the field's development.

Oyebode (2021) addresses the critical issue of funding and financing engineering programs in Nigerian universities and polytechnics. The paper underscores the severity of this problem, which often leads to strikes and educational institution

closures, emphasizing the urgent need for revitalizing engineering education to benefit Nigeria's development. Given the government's limited efforts in addressing these challenges, the paper highlights the imperative for engineering colleges to devise strategies for generating additional funds to ensure quality education and training. It scrutinizes the funding patterns concerning the quality of engineering education in Nigeria and explores alternative approaches for securing additional funds. The study recognizes funding as an external factor crucial for achieving high-quality engineering education, a shared concern among various stakeholders, including the government, parents, individuals, firms, and corporate entities (employers). To address these concerns, the paper recommends funding strategies, private sector involvement, partial deregulation, and macroeconomic strategies as potential solutions to enhance the funding landscape for engineering education in Nigeria.

Ravi (2022) delves into the ever-accelerating pace of engineering advancements and innovations, which necessitate adaptable approaches from engineering educators. Acknowledging that the engineering field thrives when challenges are identified early, well-managed, and turned into opportunities, the study emphasizes the importance of a reasoned response to these evolving dynamics. Drawing from the author's extensive background as an engineering educator, administrator, and practitioner, as well as observations of future trends in engineering education, the essay presents insightful perspectives. It underscores the significance of addressing obstacles and exploring possibilities within engineering education, as these factors significantly influence its growth trajectory. The presentation serves as a call to action, aiming to raise awareness among engineering educators and stakeholders regarding these challenges and opportunities, and fostering active discussions and debates to chart alternative solutions for the betterment of engineering education.

Bano (2022) scrutinizes Pakistan's Technical Vocational Education and Training (TVET) sector, with a particular focus on its challenges and implications for national development, especially within the context of the China Pakistan Economic Corridor (CPEC). The research underscores the paramount importance of highly skilled individuals in advancing Pakistan's progress while acknowledging the widening gap in skilled personnel. Despite the introduction of TVET to cultivate a skilled workforce, the study reveals that a significant proportion (60%) of young individuals remain unskilled or semi-skilled, primarily attributed to TVET's inability to meet the demand for trained manpower. The article provides an insightful overview of the trajectory and challenges of TVET in Pakistan, emphasizing issues such as outdated equipment, limited industry connectivity, skills deficits, and unemployment. Employing a qualitative research method, the study draws insights from 500 respondents, encompassing students, TVET professionals, teachers, and job holders within the TVET sector. The findings underscore critical challenges, including infrastructural limitations, funding gaps, inadequate skills, insufficient teacher training, and a paucity of female participation. The study concludes by offering recommendations rooted in its research analysis and findings, with the ultimate goal of addressing and remedying the challenges confronting TVET in Pakistan.

Achebe (2022) underscores the increasing demand for skilled engineers globally, driven by technological advancements and the challenges posed by socio-technological dynamics. This demand, particularly pertinent in developing countries, necessitates sustainable engineering education and practice. The research emphasizes the need to enhance sustainable engineering education, focusing on Nigeria. Historically, many economies have struggled with outdated and inefficient technology transformation methods, often failing to implement distributed problem-solving techniques effectively, primarily due to the absence of sustainable engineering education. The paper explores the potential of university-industry collaborations as a robust approach to bolstering sustainable engineering education and practice in Nigeria. The proposed areas of collaboration encompass the establishment of institutional factories and industries, revitalizing students' industrial

work experience schemes, creating engineering schools for post-graduation practical training, leveraging institutional research and development efforts, organizing joint conferences and workshops, sustaining periodic industrial visits, and facilitating research funding by industries through universities. This collaborative approach is seen as a promising means to bridge the gap between academic knowledge and practical engineering skills, ultimately meeting the increasing demand for skilled engineers in Nigeria and beyond.

Omodero (2023) investigates the repercussions of inadequate funding in the Nigerian education system, which have led to widespread educational instability, including frequent strikes and school closures, causing significant hardships for families and students. The study assesses the efficacy of two funding sources, namely the tertiary education tax and the information technology development levy, in addressing these funding challenges. Utilizing secondary data spanning from 2010 to 2021 and employing a multiple regression model, the research findings reveal that the current funding from the tertiary education tax falls short in adequately supporting academic activities in Nigeria. However, the information technology development levy exhibits a more substantial impact on education financing. To address this funding gap, the study recommends that the government explore additional funding opportunities from different national income sources to bolster the tertiary education tax. Additionally, it suggests improving fiscal planning by reallocating funds from less critical budget areas to prioritize education. Furthermore, addressing the concerns of educators is essential to ensure uninterrupted classroom activities.

Stergiou (2023) delves into the critical discourse of government investment in tertiary education, with a central focus on achieving equilibrium where marginal social costs align with marginal social value. The research acknowledges the inherent challenges in assessing the feasibility of financing higher education, particularly in establishing a tangible connection between educational inputs and outcomes. The argument for bolstering investment in tertiary education is rooted in the context of technological progress and demographic shifts, wherein continuous retraining becomes indispensable in the information age, and heightened labor productivity can mitigate the impacts of an aging population. The study's primary objective is to scrutinize the current framework for funding tertiary education in Greece and examine empirical evidence shedding light on the economic benefits of such investments in the country. Despite the formidable obstacles in funding, empirical findings illuminate that graduates play a substantial role in enhancing economic output and fostering social cohesion. The study underscores the importance of prioritizing funding policies that ensure equitable access and calls for future research aimed at determining the optimal levels of taxpayer subsidy. While allocative challenges persist across the higher education landscape in different nations, the observational and empirical evidence consistently underscores how graduates serve as catalysts for enhanced economic productivity and heightened tax revenues. In conclusion, funding tertiary education not only enriches human capital but also exerts indirect influence on research infrastructure, innovation, and overall economic growth. The research underscores the indispensable nature of investments in higher education and research and development, as they are deemed essential drivers of economic advancement, technological prowess, and global competitiveness.

Rehman (2023) investigates the integration of technology and innovative tools within geotechnical engineering education (GEE). Through a systematic analysis of published journal articles, this study delves into the realm of technology-enhanced learning (TEL) in GEE, highlighting emerging trends and challenges while offering potential solutions and research recommendations. Notable trends in TEL implementation encompass computer-based simulations, virtual laboratory experiments, and augmented reality applications. The study underscores the potential of TEL in GEE to enhance student comprehension of complex engineering concepts and better prepare them for professional practice.

Nonetheless, it acknowledges persistent challenges, such as resource availability and pedagogical optimization, while introducing an outcome-based education (OBE) theory-inspired framework to facilitate efficient TEL integration in GEE. This comprehensive review contributes to the ongoing dialogue regarding technology's role in engineering education and emphasizes the importance of addressing evolving opportunities and challenges in this dynamic field.

Tarun (2023) delves into the transformative impact of Information Technology (IT) on the education sector, revolutionizing traditional teaching and learning approaches. The study analyzes the advantages and disadvantages of incorporating technology in education, highlighting its potential to enhance engagement, personalization, and learning outcomes while narrowing the digital divide. It sheds light on the challenges faced by educators in integrating IT into classrooms, including issues related to technology accessibility and technical expertise. This comprehensive review underscores the profound shift brought about by IT in education, enabling interactive and engaging learning methods. While recognizing the hurdles in IT implementation, the study offers insights from a literature review and case studies, providing effective strategies for IT integration in education. The research findings aim to inform policymakers, educators, and stakeholders about the merits of IT in education, coupled with recommendations for a more seamless and effective incorporation of technology into the education sector.

Acharya (2023) employs critical discourse analysis, drawing from Fairclough's framework, to delve into the complex interplay of globalisation, global political economy, and their implications for Technical and Vocational Education and Training (TVET). The study uncovers various themes, including globalisation, global political economy, political ideology, the national and international labour market, TVET policy, and skill development curricula, and strives to establish connections among them. The findings illuminate the profound impact of globalisation and the global political economy on national economic policies, labour-related policies, and labour supply and demand dynamics, particularly in the context of Nepal's role as a significant labour-sending country for foreign employment. TVET's role in shaping basic- and mid-level human capital is underscored, producing semi-skilled individuals for the international labour market, albeit with associated challenges like occupational risks, exploitation, working conditions, and social and cultural dynamics. The research highlights the insufficiencies of current TVET policies and curricula in addressing these complex issues.

Methodology

This study adopts a mixed-methods research design to investigate the impact of funding sources on technology education programs in Lagos State. Quantitative data are collected using the Funding Impact on Technology Education Questionnaire (FITEQ), a structured tool with Likert-scale items designed to evaluate government funding, private sector contributions, and scholarship impacts on program success, challenges, and future prospects. The questionnaire is administered to 108 respondents from four educational institutions via mail or electronically. To complement the quantitative data, qualitative insights are gathered through semi-structured interviews with 20 participants, including educators, administrators, and students. This approach provides a deeper understanding of the experiences and perspectives related to funding and its influence on technology education. Stratified sampling ensures representation from both public and private institutions, capturing a broad range of experiences.

Quantitative data are analyzed using chi-square analysis to identify associations between funding sources and program outcomes, while qualitative data are transcribed and thematically analyzed to uncover patterns and themes. Ethical considerations include obtaining informed consent, maintaining anonymity and confidentiality, and securing approval from the relevant institutional ethics committee. The study is limited to four institutions within Lagos State, which may

not fully capture the diversity of technology education programs across the state. Additionally, reliance on self-reported data introduces the possibility of response bias.

Results

Hypothesis 1: Government Funding and Program Success

HO1**:** There is no statistically significant association between the level of government funding and the success of technology education programs in Lagos State.

Table 1: level of government funding and the success of technology education programs in Lagos State

Response	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**Total**
Success	9	12	18	30	39	108
Resources	8	11	19	31	39	108
Innovation	7	10	20	32	39	108
Total	**24**	**33**	**57**	**93**	**117**	**324**

Table 1b: level of government funding and the success of technology education programs in Lagos State

Variable	**SD**	**D**	**N**	**A**	**SA**	**Total**	**df**	**α**	**χ^2**	**χ^2 crit**	**Decision**
Success	9	12	18	30	39	108	8	.05	0.60	15.51	Accepted
Resources	8	11	19	31	39	108					
Innovation	7	10	20	32	39	108					
Total	**24**	**33**	**57**	**93**	**117**	**324**					

Hypothesis 2: Private Sector Funding and Program Challenges

HO2: There is no statistically significant relationship between private sector funding and the challenges faced by technology education programs in Lagos State.

Table 2: private sector funding and the challenges faced by technology education programs in Lagos State

Response	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**Total**
Challenges	10	11	18	30	39	108
Autonomy	8	11	19	31	39	108
Resources	8	9	20	32	39	108
Total	**26**	**31**	**57**	**93**	**117**	**324**

Table 2b: private sector funding and the challenges faced by technology education programs in Lagos State

Variable	**SD**	**D**	**N**	**A**	**SA**	**Total**	**df**	**α**	**χ^2**	**χ^2 crit**	**Decision**
Challenges	10	11	18	30	39	108	8	.05	1.13	15.51	Accepted
Autonomy	8	11	19	31	39	108					
Resources	8	9	20	32	39	108					
Total	**26**	**31**	**57**	**93**	**117**	**324**					

Hypothesis 3: Scholarship and Future Prospects

HO3: There is no statistically significant impact of scholarships on the optimism and expectations for the future sustainability of technology education programs in Lagos State.

Table 3: impact of scholarships on the optimism and expectations for the future sustainability of technology education programs

Response	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**Total**
Quality	9	12	18	28	41	108
Talent	9	11	18	30	40	108

Optimism	9	10	20	30	39	108
Total	**27**	**33**	**56**	**88**	**120**	**324**

Table 3b: impact of scholarships on the optimism and expectations for the future sustainability of technology education programs

Variable	**SD**	**D**	**N**	**A**	**SA**	**Total**	**df**	**α**	**χ^2**	**χ^2 crit**	**Decision**
Quality	9	12	18	28	41	108	8	.05	0.29	15.51	Accepted
Talent	9	11	18	30	40	108					
Optimism	9	10	20	30	39	108					
Total	**27**	**33**	**56**	**88**	**120**	**324**					

Discussion of Findings

The first hypothesis examines whether government funding is significantly associated with program success. The chi-square test resulted in a value of 0.60, which is much lower than the chi-square critical value (15.51) at a 0.05 significance level. Since the calculated value is less than the critical value, we fail to reject the null hypothesis (H01). This means that there is no statistically significant relationship between government funding and program success. The responses indicate that variations in program success, resource availability, and innovation do not strongly depend on government funding.

This hypothesis explores whether private sector funding is significantly related to the challenges faced by technology education programs. The chi-square test produced a value of 1.13, which is also much lower than the chi-square critical value (15.51) at a 0.05 significance level. Since the calculated value is less than the critical value, we fail to reject the null hypothesis (H02). This implies that private sector funding does not have a statistically significant relationship with program challenges. Although challenges, autonomy, and resource needs exist, they do not appear to be significantly influenced by private sector funding levels.

The third hypothesis investigates whether scholarships significantly impact the optimism and future sustainability of technology education programs. The chi-square test yielded a value of 0.29, which is far lower than the critical value (15.51) at a 0.05 significance level. Since the calculated chi-square value is less than the critical value, we fail to reject the null hypothesis (H03). This means that scholarships do not have a statistically significant impact on future prospects. While scholarships may help students, the data does not provide enough statistical evidence to conclude that they directly influence program quality, talent development, or optimism about future sustainability.

Contrary to the initial interpretation, the statistical analysis does not support the hypotheses. Instead, the findings indicate that government funding, private sector funding, and scholarships do not have a statistically significant relationship with program success, program challenges, or future prospects, respectively. This suggests that other factors beyond funding might play a more critical role in shaping the success and sustainability of technology education programs in Lagos State. Future research could explore additional variables, such as curriculum quality, instructor expertise, industry partnerships, and student engagement, to better understand what drives success in these programs.

Conclusıon

This research has provided valuable insights into the complex interplay between funding sources and various dimensions of engineering education programs. The findings reveal that government funding plays a pivotal role in enhancing program success, as indicated by the statistically significant relationship between government funding and positive perceptions of success, resources, and innovations. This underscores the importance of sustained government support for

engineering education to ensure its continued growth and effectiveness.

Moreover, the study underscores the significance of private sector funding in addressing program challenges, particularly in terms of autonomy and resource availability.

Recommendations

1. Institutions and policymakers should diversify funding sources by exploring public-private partnerships to secure sustained financial support. Collaborative efforts between governments, private enterprises, and scholarship providers can strengthen the financial stability of technology education programs.
2. Governments should commit to a long-term vision for funding technology education, ensuring consistent and substantial financial support for institutions. Prioritizing and maintaining funding commitments over time is essential for program success and quality.
3. Private sector collaborations should go beyond financial contributions to include active engagement in developing tailored skill-building programs. These partnerships can align academic learning with industry needs, enhancing workforce readiness among technology education graduates.
4. Scholarship providers should work to make scholarships more accessible to a broader range of engineering students. Transparent and inclusive application processes, coupled with targeted outreach to underrepresented groups, can increase accessibility and equity.

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TEACHING COMPETENCIES AND STUDENTS ENGAGEMENT AS PREDICTORS OF STUDENTS' ACADEMIC PERFORMANCE IN BUSINESS EDUCATION IN COLLEGES OF EDUCATION

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ABSTRACT

The study was carried out to determine the teaching competencies and student's engagement as predictors of students' academic performance in business education in colleges of education. Two research questions were raised for the study and two hypotheses were tested at 0.05 level of significance. Correlation research design was used for the study and the population of the study consist of 2,173 students of business education. The sampling technique adopted for the study was probability proportional to size (PPS) technique and a sample of 325 respondents was considered adequate. The instrument used for the study was structured questionnaire, validated by experts. A reliability test was conducted with the use of Cronbach Alpha which yielded a reliability coefficient of 0.81 and was considered adequate. Total numbers of 325 copies of the questionnaire was administered to respondents and were retrieved. Demographic variables were analysed with the use of percentages while research questions were analysed with mean and standard deviation. Linear regression statistical analysis was used to test the hypotheses. The results indicate that teaching methodologies applied by lecturers in teaching business education students is considered adequate while students' engagement in business education classes is very high. It was revealed that teaching competencies and student's engagement significantly predict business education students' academic performance in the colleges of education. It was concluded that when lecturers are competent (subject knowledge, lecturers' attendance, teaching skills and lecturers' attitude) in teaching learning process, students' academic performance is bound to be better. It was recommended among others that there is need for business education students to be more engaged in their studies, since the more engaged they are, the better their performance.

Keywords: ***Teaching competencies, Student engagement, Predictor, Business education, Academic Performance.***

Introduction

There is a growing trend around institutions of higher learning in the globe to ensure high ranking and quality outputs measured in terms of quality graduates being produced. To achieve such aspiration, university and college teaching and learning must consider some factors such as teachers' characteristics and students' personality characteristics. In the bid to bring about improvement in students' academic performances, the need for effective teaching and learning to take place in schools, colleges and universities as well as other learning environment across the globe is on the increase. Therefore, teachers' competencies and students' engagement are crucial factors in teaching and learning processes that can bring about improved academic performance. The need to look into how these factors are able to predict the performance of students in Business education is very paramount.

Poor academic performance of students in tertiary institutions has gained the attention of researchers in the field of education. Previous studies on the subject of students' academic performance by AL-Mutairi (2011) and Kang'ahi, Indoshi, Okwach and Osido (2012) indicated that there are several factors that affects student's academic performances, but lecturers' competencies (subject knowledge, lecturers' teaching skills, lecturers' class attendance and lecturers' attitude) and methods of teaching remain the major determinants of student's academic achievement. Adu and Olatundun, (2013) also revealed that several elements of lecturers' competencies include lecturers' teaching skills, lecturers' subject knowledge, lecturers' attitude, and lecturers' attendance. This is in line with the study of Fehintola, (2014) which revealed that, a student may have more than one reason for poor academic performance and that a quick intervention will lead to the identification of the factors responsible and solutions to them. According to Canuto, Choycawen, and Pagdawan, (2024), professionalism is the main teaching competency influencing teachers' performance which can negatively affect expected students academic performance. Therefore, teachers' professionalism needs to be well taken care of for improved students' performance. This indicates that, training of teachers should be looked into and that only qualified and competent teachers should be employed in various schools and only this can guarantee the nation, expected development and growth. In line with this, the outcome of the findings of Ferdinand and Andala (2023) indicate that the teachers' qualifications and competence can positively impact the performance of their students.

Student engagement on the other hand refers to the amount of interest, attention, optimism, curiosity, and passion that a student shows when he is learning a particular thing or being taught, which includes the amount of motivation he has to grasp and advance in his education (Jonathan & Amada, 2018). Engagement is influenced by a number of factors, these include; campus climate, students' experience of engagement, and students' willingness to participate. Student's engagement is measured by the climate of the campus and experience of engagement students has (Dunleavy & Milton, 2009). Campus climate is influenced by the way institutions manage their resources, organises the curriculum, and other opportunities of learning to make each student participate in various school activities (Coates, 2010). Jones (2009) also noted that, when a conducive environment for learning is created, the student will be more interested and participate in the learning process. The perception of the school environment positively can enhance good academic success through engagement (Wang & Holcombe, 2010).

Engagement can also be influence by students' readiness to participate in educational activities such as class attendance, submission of necessary assignments, and observing class instructions (Isabel, 2016). It was noted by Lee-Nagarajah, Tek, Hashim, and Meng, (2011); Wang and Holcombe, (2010) that, any student that has a good rating in academic engagement has the tendency to produce better academic performance. Also, students with poor capability also enjoy more benefit from engagement compared to his other classmates (Carini, Kuh, & Klein, 2006). Fuertes, H. G. et.al (2023)

noted that the level of student engagement of some students could be low. Where such is the case, the affected students need to be more engaged in their classes. Which invariably indicate that students need help in order for them to be more engaged in school activities for expected outcome.

Despite the benefits of student's engagement, its relationship with academic performance has not been firmly established. Lack of students' engagement at various school levels have become a serious concern for policymakers and education scholars because the disengaged student is more likely to be struggling with his academic activities, he could drop out of school, and also have behaviour complications (Fredricks, Blumenfeld & Paris, 2004). Looking from a perspective of development, student's failure in academics and dropping out of school are not outlying circumstances but the outcome of a long term process of school disengagement by the student (Randolph, Fraser, & Orthner, 2004). Thus, well-enhanced student engagement could help prevent poor students' outcomes. Lee (2014) also opined that students' engagement at school was significant in predicting academic performance.

Statement of Problem

The hallmark of any teaching is centred on professional methodology especially in the areas of presenting information, skills, and techniques demonstration. Teaching competencies and student's engagement are determinants of academic performance of students in business education. Some students find it difficult to engage in serious activities such as spending quality time with their studies and putting necessary efforts into their study and other purposeful activities that can produce credible academic performance and better results. Therefore both students' engagement and teachers' competencies are expected to harmoniously complement one another to produce effective teaching and learning of business education in Colleges of Education, as well as predict what the likely outcome of the students will be. Lee, (2014) however opined that teachers should assume new competencies that affect concepts and attitudes in education and learning within the framework of training projects. It was observed that Colleges of Education students academic performance is becoming a thing of concern to educators and school administrators, as students no longer graduate with highest grades (distinction) and majority of them have settled for lower grades (merit and pass). This study tries to answer the question; who or what is responsible for such performance?

Purpose of the Study

The main purpose of the study is to examine lecturers' teaching competencies and students' engagement as predictors of students' academic performances in business education in Colleges of Education. Specifically, purposes of the study are to:

1. Determine whether lecturers' competencies are predictors of business education students' academic performances in Colleges of Education.
2. Examine the extent to which students' engagement predict their academic performances in Colleges of Education.

Research Questions

The following research questions were raised to guide the study.

1. To what extent do lecturers demonstrate competence in teaching business education students in Colleges of Education?
2. What is the extent of students' engagement in learning business education courses in Colleges of Education?

Research Hypotheses

The following hypotheses were formulated for the study and were tested at 0.05 level of significance.

$H0_1$:Teaching competencies do not significantly predict business education students' academic performance in Colleges of Education.

$H0_2$: Students' engagement does not significantly predict business education students' academic performance in Colleges of Education.

Methodology

Correlational research design was adopted for the study. The population of the study consist of all NCE II and NCE III students of business education in Colleges of Education in Kwara and Ekiti State. Research advisors' sample size table was used to determine a sample of 325 which was drawn proportionately from all the Colleges of Education, using probability proportional to size (PPS) technique. This sampling technique is necessary for the study in the sense that the schools do not have equal population. A well structured questionnaire was developed and used as instrument for data collection. The instrument for data collection was face and content validated by experts while Cronbach Alpha method was used to determine the reliability coefficient of 0.81. The coefficient is high which indicate that the instrument is reliable. The research questions were analysed using mean and standard deviation; while linear regression statistical analysis was used to test the hypotheses at 0.05 level of significance.

Results

Research Question 1: To what extent do lecturers demonstrate competence in teaching business education students in Colleges of Education?

Table 1: Mean and Standard Deviation of Responses on the Extent of Lecturers' Competence

S/N	Item Statement	Mean	SD	Remarks
1	Lecturers can provide clear information about objectives and contents in the subject curriculum while teaching.	3.39	0.54	HE
2	Lecturers demonstrate good classroom encouragement and motivation.	3.57	0.51	VHE
3	Lecturers' presentation of subject matter is tailored toward students' knowledge.	3.53	0.61	VHE
4	Lecturers' presentation of contents of the lesson in a clear and logical manner aids better understanding of students.	3.69	0.53	VHE
5	The way lecturers attend and respond to questions in the classroom enhances effective learning of Business Education courses.	3.60	0.56	VHE
6	Lecturers' mastery of the subject contents promotes better understanding of the contents.	3.55	0.50	VHE
7	Lecturers possess good mastery of subject contents of the course which encourages students.	3.59	0.55	VHE
8	Use of appropriate resource materials by the lecturers facilitates better understanding of Business Education courses.	3.44	0.50	HE
9	Quality interaction between students and lecturers can enhance effective teaching and learning of Business Education courses.	3.42	0.49	HE
10	Lecturers' use of relevant examples can promote the acquisition of appropriate competencies.	3.16	0.45	HE
11	Lecturers' provision of rich course materials influence students' understanding.	3.87	0.38	VHE
12	Lecturers' teaching skill enhances better understanding of Business Education courses.	3.44	0.52	HE
13	Lecturers' subject knowledge has a lot to do in Business Education classes.	3.41	0.52	HE
14	Attitude of lecturers towards students in the classroom enhances better understanding.	3.13	0.39	HE
15	Lecturers' regular attendance of classes enhances students' understanding of the contents.	3.34	0.58	HE
	Weighted Average	**3.47**	**0.51**	**HE**

Table above reveals that the respondents indicated very high extent of lecturer's competence on items; 2, 3, 4, 5, 6, 7 and 11 with mean scores; 3.57, 3.53, 3.69, 3.60, 3.55, 3.59, and 3.87 respectively. The respondents expressed high extent of lecturer's competence on items; 1, 8, 9, 10, 12, 13, 14 and 15 with mean scores; 3.39, 3.44, 3.42, 3.16, 3.44, 3.41, 3.13 and 3.34 respectively. The standard deviation also revealed that responses were not too widely spread as the values ranges from 0.38 - 0.61. In summary, lecturers' teaching competencies were observed to be of high extent, as the weighted average mean revealed 3.47 with standard deviation of 0.51. The implication of the study is that when lecturers are competent (subject knowledge, lecturers' attendance, teaching skills and lecturers' attitude), particularly in teaching business education, students' academic performance is bound to be better.

Research Question 2: What is the extent of students' engagement in learning business education courses in Colleges of Education?

Table 2: Mean and Standard Deviation of Responses on Extent of Students' Engagement

S/N	Item Statement	Mean	SD	Remarks
1	Students are involved in a way of collaborating with other students.	3.56	0.57	VHE
2	Students ask questions often in the teaching and learning process.	3.49	0.52	HE
3	The amount of time and effort students put into their studies and other school activities enhances their classroom participation.	3.51	0.57	VHE
4	The degree of attention shown by students when learning enhances students' understanding.	3.48	0.54	HE
5	The amount of curiosity and interest that students show when learning enhances better classroom participation.	3.48	0.58	HE
6	The level of motivation that students show when they are learning enhances students' classroom participation.	3.53	0.52	VHE
7	The level of optimism and passion that students show when they are learning enhances students' classroom participation.	3.50	0.53	VHE
8	The level of students' willingness to participate in educational activities such as attending classes, submitting assignments, and observing class instructions enhances their classroom participation.	3.60	0.51	VHE
9	Students are actively involved in classroom participation.	3.49	0.54	HE
10	Effective classroom teaching and learning is a function of effort made and persistence by students in the classroom.	3.46	0.53	HE
11	Students' participation in classroom can be enhanced by the level of extra-curricular activities.	3.46	0.52	HE
12	Students' commitment to academic challenges can enhance their classroom participation.	3.52	0.53	VHE
13	Students' willingness to learn enhances their participation in the classroom.	3.56	0.51	VHE
14	Setting personal educational goals by students enhances their participation in the classroom.	3.54	0.50	VHE
15	Student active participation in course assignments enhances better understanding.	3.59	0.49	VHE
—	**Weighted Average**	**3.51**	**0.53**	**VHE**

The table above also revealed that respondents perceived students' engagement in predicting their performance to a very high extent on the items; 1, 3, 6, 7, 8, 12, 13, 14, and 15 with the mean scores; 3.56, 3.51, 3.53, 3.50, 3.60, 3.52, 3.56, 3.54, and 3.59 respectively. The respondents expressed high extent of students' Engagement on items; 2, 4, 5, 9, 10 and 11with mean scores; 3.49, 3.48, 3.48, 3.49, 3.46, and 3.46 respectively. Summarily, students' engagement in business education classes in Colleges of Education is to a very high extent, as the weighted average mean revealed 3.51 and standard deviation is 0.53. The implication of the above is that when business education students are well engaged with their studies, their academic performance will be better.

H_{01}: Teaching competencies do not significantly predict business education students' academic performance in Colleges of Education.

Table 3:Summary of Regression Analysis on Teaching Competencies as Predictor of Business Education Students' Academic Performance

Model	N	R	R Square	Adjusted R Square
1	325	0.506	0.256	0.254

Dependent Variable: Academic Performance

Table 4: Test of Significance

	Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
(Constant)	6.293	5.066		1.242	.215	3.674	16.261
Teaching Competencies	1.755	.166	.506	10.540	.000	1.427	2.082

Dependent Variable: Academic Performance

Table 3 summarizes the regression results of teaching competencies as predictor of business education students' academic performance. The result indicated that there is a positive correlation between teaching competencies and students' academic performance (R = 0.506) while R-square is 0.256 which means that the independent variable (teaching competencies) explained 50.6% variations of the dependent variable (academic performance). The test of significance results as presented in Table 4 showed that teaching competencies statistically significantly predict students' academic performance (B = 1.755; $t_{(325)} = 10.540$, P = 0.000). It indicated that at 5% level of significance there is enough evidence that the regression equation predicted that teaching competencies significantly predict business education students' academic performance in Colleges of Education. Based on this, the null hypothesis is rejected. Therefore, teaching competencies does significantly predict business education students' academic performance in Colleges of Education.

H_{02}: Students' engagement does not significantly predict business education students' academic performance in Colleges of Education..

Table 5: Summary of Regression Analysis on Students' Engagement as Predictor of Business Education Students' Academic Performance

Model	N	R	R Square	Adjusted R Square
1	325	0.385	0.148	0.146

Dependent Variable: Academic Performance

Table 6: Test of significance

Model	Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval	
	B	Std. Error	Beta	T	Sig.	Lower Bound	Upper Bound
(Constant)	11.338	6.435		1.762	.079	1.322	23.998
Students' Engagement	1.580	.211	.385	7.501	.000	1.166	1.994

Dependent Variable: Academic Performance

Table 5 summarizes the regression results of students' engagement as predictor of business education students' academic performance. The result indicated that there is a positive correlation between students' engagement and students' academic performance (R = 0.385) while R-squared is 0.148 which means that the independent variable (students' engagement) explained 14.8% variations of the dependent variable (academic performance). The test of significance results as presented in Table 6 showed that students' engagement significantly predict students' academic performance (B = 1.580; $t_{(325)} = 7.501$, P = 0.000). It indicated that at 5% level of significance there is enough evidence that the regression equation predicted that students' engagement significantly predict business education students' academic performance. Based on this, the null hypothesis is rejected. Therefore, students' engagement significantly predict business education students' academic performance in Colleges of Education.

Discussion of Findings

It was revealed in the findings that lecturers' competency in teaching business education students in Colleges of Education is high. This involves the ability and willingness of the teachers to bring to the notice of the student's necessary information required at different levels of study. The study found that teaching competence is a significant factor in predicting business education students' academic performance in Colleges of Education. This finding is supported by Alexander (2013) whose findings revealed that subject knowledge, lecturers' class attendance, teaching skills, and lecturers' attitude (teaching competencies) have a significant positive influence on students' academic performances. We can see from table 2 that students' engagement in business education classes in Colleges of Education is to a very high extent. This is in line with the findings of Lee-Nagarajah, Tek, Hashim, and Meng, (2011) who indicated that students with favourable ratings on their academic engagement perform better academically. This however entails that when students are better engaged with their studies, they are likely to perform better academically.

Table 4 showed that teaching competencies statistically significantly predict students' academic performance. Where (B = 1.755; $t_{(325)} = 10.540$, P = 0.000), this indicate that at 5% level of significance, the regression equation predicted that teaching competencies significantly predict business education students' academic performance in Colleges of Education. Based on this, the null hypothesis was rejected and it was concluded that teaching competencies does significantly predict business education students' academic performance in Colleges of Education.

Table 6 revealed that students' engagement significantly predict students' academic performance i.e (B = 1.580; $t_{(325)} = 7.501$, P = 0.000). This indicated that at 5% level of significance, the regression equation predicted that students' engagement significantly predict business education students' academic performance. Therefore the null hypothesis was

rejected and it was concluded that students' engagement significantly predict business education students' academic

performance in Colleges of Education. This claim is supported by Lee (2014) who also indicated that student engagement at school can significantly predict academic performance.

Conclusion

This paper assessed the teaching competencies and students' engagement as predictors of business education students' academic performance in Colleges of Education. It was revealed that for a better student's performance, lecturers teaching each course need to be very competent in the areas of subject knowledge, teaching skills, attendance to lectures as well as being able to exhibit good attitude within and outside the classroom. Students must also attend classes and need to be more engage with their academic programme. This is because the more engaged a student is, the better their performances is likely to be.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. There is need for school management to review the recruitment policy of lecturers into the department of business education. This will go a long way at reducing the number of unqualified staff that may not be competent in the classroom.
2. Need for training and re-training of business education lecturers must be seen as an important aspect of their carrier, to improve on their competencies.
3. Business education students need to be more engaged with their studies, this is because the more engaged they are in their studies, the better their performance.
4. Business education lecturers need to always prepare very well for each of their lectures to improve students output. This is because their subject knowledge and teaching skills have a great influence on the academic performance of their students.

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IMPACT OF TECHNOLOGY INTEGRATION ON ECONOMICS IN SENIOR SECONDARY SCHOOLS IN LAGOS STATE, NIGERIA

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ABSTRACT

This study investigates the impact of technology integration on economics in senior secondary schools in Lagos State, Nigeria. Technology integration is the use of digital tools, software applications, multimedia resources, and online platforms to facilitate teaching and learning activities. Three (3) research questions and one (1) research hypothesis guided the study. The study employed descriptive survey research designs. The simple random sampling technique was used in selecting a sample size of 30 Economics teachers. The research instrument used for the data collection in this study was self-structured questionnaire titled "Technology Integration Questionnaire (TIQ). The data collected were analyzed using descriptive and inferential statistics to determine the relationship between technology integration and students' academic outcomes. Based on these findings, the study revealed that there was significant relationship between technology integration and students' academic performance in Economics in Senior Secondary Schools. This implies that Technology can enhances the teaching and learning of Economics in senior secondary schools; technology can improve teachers' digital literacy skills; technology can help prepare students for the digital demands of the 21st century; and technology can use online assessment tools and quizzes to evaluate learners' progress. The study recommended that schools should invest in reliable digital infrastructure, including internet connectivity, smart boards, projectors, and computers, to ensure smooth integration of technology in Economics lessons. The study also recommended that regular training and workshops should be organized for Economics teachers to enhance their competence and confidence in using digital tools effectively for teaching.

Kevwords: **Technology Integration, Digital Tools, Teaching and Learning of Economics.**

Introduction

Education plays a crucial role in shaping the intellectual, social, and economic development of individuals and nations.

With the rapid advancement of technology in the 21st century in various sectors, including education, have undergone significant transformations. One notable trend in education is the integration of technology into teaching and learning processes. Technology has become increasingly important in Nigerian education at all levels. Technology integration has become an essential component of modern teaching and learning processes, transforming traditional classrooms into dynamic learning environments. Recently, technology has been recognized as a tool to enhance students' engagement, improve instructional delivery, and develop critical thinking skills (Anderson & Kumar, 2021).

Technology integration is the use of digital tools, software applications, multimedia resources, and online platforms to facilitate teaching and learning activities. Examples of technology used in Economics classrooms include interactive whiteboards, educational apps, online simulations, digital presentations, and data analysis software. These tools can help make abstract economic concepts more tangible and relatable for students by providing visual representations and practical simulations (Kirkwood & Price, 2014). The benefits of technology integration in teaching and learning Economics are multifaceted. Firstly, it promotes student engagement by incorporating multimedia content that captures students' interest and encourages participation. Secondly, it fosters collaborative learning by enabling students to work together on virtual platforms and share ideas. Thirdly, technology facilitates personalized learning by allowing students to progress at their own pace and access additional resources to reinforce their understanding of complex topics (Means et al., 2013).

The outbreak of the COVID-19 pandemic in 2020 has highlighted the importance of technology in education, as schools around the world shifted to remote and blended learning models. This transition accelerated the adoption of educational technologies such as virtual classrooms, digital assessment platforms, and online collaborative tools (Ngugi & Wekesa, 2023). Despite these advancements, challenges such as digital divide, inadequate teacher training, and limited access to digital infrastructure remain significant barriers to effective technology integration in many senior secondary schools (Yusuf & Adekunle, 2023). Research findings have emphasized that technology integration in teaching economics can foster better learning outcomes when appropriately implemented. Interactive platforms and data visualization tools have been found to improve students' understanding of key economic principles, making learning experiences more interactive and practical (Agbaje & Salami, 2021). Moreover, studies indicate that technology-enhanced teaching methods can accommodate diverse learning preferences and improve academic performance among senior secondary school students (Chen & Malik, 2022).

However, the success of technology integration is heavily dependent on the preparedness and adaptability of teachers. Professional development and ongoing support are critical to ensuring that educators can effectively harness digital tools for instruction (Johnson & Eze, 2024). Educational policymakers are encouraged to prioritize investments in digital infrastructure and teacher training to maximize the benefits of technology in the teaching and learning of economics (Olaniyan & Bello, 2025). Economics is one of the elective subjects offered at the senior secondary schools (SSS) level. Economics as a subject taught in senior secondary schools, requires students to develop analytical skills, critical thinking abilities, and a comprehensive understanding of economic concepts and real-world applications. Traditional methods of teaching Economics often rely on textbooks, lecture notes, and teacher-centered approaches. However, such methods may fall short in engaging students, fostering interactivity, and adequately illustrating complex economic principles (Yusuf & Balogun, 2011).

Therefore, the integration of technology in teaching Economics has the potential to enhance students' learning experiences and improve academic performance. In light of these developments, this study seeks to investigate the effect of technology

integration on the teaching and learning of Economics in senior secondary schools. It aims to provide insights into best practices, identify challenges, and offer recommendations for enhancing the use of technology in Economics.

Statement of the Problem

Despite the growing recognition of the importance of technology in education, many senior secondary schools face challenges in effectively integrating digital tools into the teaching and learning of Economics. Economics as a subject requires an analytical and dynamic approach to help students understand complex concepts, analyze real-world economic scenarios, and interpret data. However, traditional teaching methods that rely heavily on textbooks and lecture-based instruction often fail to engage students or provide practical applications of economic principles. In recent years, technological advancements have presented opportunities to transform Economics education. Tools such as simulation software, data visualization platforms, and interactive online resources have the potential to enhance teaching effectiveness and promote active learning. However, in many senior secondary schools, teachers and students face significant barriers to technology adoption, including inadequate access to digital infrastructure, poor internet connectivity, and insufficient training for teachers, etc. Therefore, this study seeks to investigate the impact of technology integration on economics in senior secondary schools in Lagos State, Nigeria. It aims to identify the challenges faced, assess the impact on students' academic outcomes and engagement, and provide recommendations for effective technology adoption in Economics education.

Purpose of the Study

The main purpose of this study is to investigate the impact of technology integration on economics in senior secondary schools in Lagos State, Nigeria. The specific objectives of this study are to:

1. examine the level of technology integration in the teaching and learning of Economics in senior secondary schools.
2. ascertain the impact of technology integration on students' academic performance in Economics.
3. identify the challenges faced by teachers and students in adopting and integrating technology into Economics.

Research Questions

The study will be guided by the following research questions:

1. To what extent is technology integrated into the teaching and learning of Economics in senior secondary schools?
2. How does technology integration impact students' academic performance in Economics?
3. What are the challenges faced by teachers and students in adopting and integrating technology into Economics?

Research Hypothesis

The following hypothesis guided this study:

Ho_1: There is no significant relationship between technology integration and students' academic performance in Economics.

Methodology

This study provides a comprehensive overview of the methodology used to investigate the impact of technology integration on economics in senior secondary schools in Lagos State, Nigeria. A descriptive survey research design was used for this study. The purpose of descriptive research is to describe systematically the facts, qualities and characteristics of a given population (Nworgu, 2014). The target population of this study comprised of Economics teachers in senior secondary schools within the selected study area. A simple random sampling technique was used to select six (6) senior secondary schools; and thirty (30) Economics teachers were randomly selected in the schools. The research instrument used in this study was a self-structured questionnaire title "Technology Integration Questionnaire (TIQ)" which consisted of two sections. The instruments will be validated by experts in measurement and evaluation; and Economics education to ensure content and face validity. A pilot test will be conducted, and the reliability of the questionnaire will be determined using Cronbach's Alpha of 0.80. The questionnaires were administered and collected personally by the researchers in the field. The researchers encouraged the respondents to complete the questionnaire without influencing them materially. The questionnaires completed by the teachers were collected by the researcher for analysis. The data collected for the research was analysed using simple percentages to answer research questions. The data collected was analysed using descriptive and inferential statistics to determine the relationship between technology integration and students' academic performance in Economics. The level of significance was set at 0.05, and a p-value less than 0.05 was considered statistically significant.

Results

Research Question One: To what extent is technology integrated into the teaching and learning of Economics in senior secondary schools?

Table 1: Technology Integration into the Teaching and Learning of Economics in Senior Secondary Schools

S/N	Item Statement	SA (%)	A (%)	D (%)	SD (%)	Total	Remarks
1	I am familiar with various educational technology tools that can be used in Economics teaching.	8 (26.7%)	10 (33.3%)	8 (26.7%)	4 (13.3%)	30 (100%)	Agreed
2	I feel confident in my ability to integrate technology into my Economics teaching.	7 (23.3%)	16 (53.3%)	6 (20.0%)	1 (3.3%)	30 (100%)	Agreed
3	I believe that technology can enhance the teaching and learning experience in the Economics classroom.	9 (30.0%)	17 (56.7%)	4 (13.3%)	0 (0.0%)	30 (100%)	Agreed
4	Digital tools make Economics lessons more interactive and engaging.	6 (20.0%)	11 (36.7%)	5 (16.7%)	8 (26.7%)	30 (100%)	Agreed
5	I feel that my school provides adequate resources for integrating technology into my Economics teaching.	6 (20.0%)	5 (16.7%)	17 (56.7%)	2 (6.7%)	30 (100%)	Disagree
—	**Grand Total**	**36 (24.0%)**	**59 (39.3%)**	**40 (26.7%)**	**15 (10.0%)**	**150 (100%)**	**Agreed**

From table 1 above, analysis of items 1 to 5 shows that 95 (63.3%) of the participants agreed that the extent of technology integration into the teaching and learning of Economics in senior secondary schools; and while 55 (36.7%) disagreed with the statement.

Research Question Two: How does technology integration impact students' academic performance in Economics?

Table 2: Impact of Technology Integration on Students' Academic Performance in Economics

S/N	Item Statement	SA (%)	A (%)	D (%)	SD (%)	Total	Remarks
1	I feel that using technology in Economics teaching can improve teachers' digital literacy skills.	11 (36.7%)	17 (56.7%)	2 (6.7%)	0 (0.0%)	30 (100%)	Agreed
2	Digital learning resources enhance my academic performance in Economics.	8 (26.7%)	14 (46.7%)	5 (16.7%)	3 (10.0%)	30 (100%)	Agreed
3	I believe that using technology in Economics teaching can help prepare students for the digital demands of the 21st century.	10 (33.3%)	16 (53.3%)	3 (10.0%)	1 (3.3%)	30 (100%)	Agreed
4	I am comfortable with the use of interactive whiteboards and other presentation tools in Economics.	8 (26.7%)	12 (40.0%)	5 (16.7%)	5 (16.7%)	30 (100%)	Agreed
5	I am able to use online assessment tools and quizzes to evaluate learners' progress.	7 (23.3%)	10 (33.3%)	9 (30.0%)	4 (13.3%)	30 (100%)	Agreed
—	**Grand Total**	**44 (29.3%)**	**69 (46.0%)**	**24 (16.0%)**	**13 (8.7%)**	**150 (100%)**	**Agreed**

From table 2 above, analysis of items 5 to 10 shows that 113 (75.3%) of the participants agreed that the technology integration impact students' academic performance in Economics; and while 37 (24.7%) disagreed with the statement.

Research Question Three: What are the challenges faced by teachers and students in adopting and integrating technology into Economics?

Table 3: Challenges faced by teachers and students in adopting and integrating technology into Economics.

S/N	Challenges	Yes (%)	No (%)	Total (%)
1	Poor internet connectivity	20 (66.7%)	10 (33.3%)	30 (100%)
2	Limited access to digital devices	17 (56.7%)	13 (43.3%)	30 (100%)
3	Inconsistent power supply	16 (53.3%)	14 (46.7%)	30 (100%)
4	Insufficient training and professional development	19 (63.3%)	11 (36.7%)	30 (100%)
5	Time constraints in learning new technologies	13 (43.3%)	17 (56.7%)	30 (100%)
—	**Grand Total**	**85 (56.7%)**	**65 (43.3%)**	**150 (100%)**

Source: Authors' Computation, 2025

From table 3 above, analysis of items 11 to 15 shows that 85 (56.7%) of the participants agreed that the challenges faced by teachers and students in adopting and integrating technology into Economics; and while 65 (43.3%) disagreed.

Testing of Hypothesis

Hypothesis One: There is no significant relationship between technology integration and students' academic performance in Economics.

Table 4: Technology integration and students' academic performance in Economics

Variables	Mean	SD	f	t-cal	p-val	Remarks
Technology integration	1.15	0.37				
Students' academic performance in Economics	1.20	0.41	0 8	2 0.78	0.06	Ho1 rejected

**** Significant,* P < 0.05**

Analysis of table 4 above revealed that the calculated value t-cal (0.78) is greater than p-val (0.06) at 0.05 level of significance. Based on this result, the null hypothesis which stated that "there is no significant relationship between technology integration and students' academic performance in Economics" was rejected. Thus, there is significant relationship between technology integration and students' academic performance in Economics. This implies that technology integration enhances the teaching and learning experience in Economics; and digital tools make Economics lessons more interactive.

Discussions

The discussion of findings are discussed in relation to the research questions and hypothesis. The finding of research question one revealed that 95(63.3%) of the participants agreed that the extent of technology integration into the teaching and learning of Economics in senior secondary schools; and while 55(36.7%) disagreed with the statement. This implies that technology enhances the teaching and learning experience in Economics classroom; educational technology tools can be used in Economics teaching; and digital tools make Economics lessons more interactive. The finding of research question two revealed that 113(75.3%) of the participants agreed that the technology integration impact students' academic performance in Economics; and while 37(24.7%) disagreed with the statement. This implies that technology can improve teachers' digital literacy skills; technology can help prepare students for the digital demands of the 21st century; and technology can use online assessment tools and quizzes to evaluate learners' progress.

The finding of research question three revealed that 85(56.7%) of the participants agreed that the challenges faced by teachers and students in adopting and integrating technology into Economics; and while 65(43.3%) disagreed. This implies that challenges faced by Economics teachers in adopting and integrating technology are poor internet connectivity; limited access to digital devices; inconsistent power supply; insufficient training and professional development; and time constraints in learning new technologies.

The finding of research hypothesis one revealed that the calculated value t-cal (0.78) is greater than p-val(0.06) at 0.05 level of significance. Based on this result, the null hypothesis which stated that "there is no significant relationship between technology integration and students' academic performance in Economics" was rejected. Thus, there is significant relationship between technology integration and students' academic performance in Economics. This implies that technology integration enhances the teaching and learning experience in Economics, and digital tools make Economics lessons more interactive.

Conclusion

This study investigates the impact of technology integration on Economics in senior secondary schools in Lagos State, Nigeria. Technology integration is the use of digital tools, software applications, multimedia resources, and online platforms to facilitate teaching and learning activities. Based on the findings, it was concluded that there is significant relationship between technology integration and students' academic performance in Economics. This means that technology enhances the teaching and learning of Economics in senior secondary schools; technology can improve teachers' digital literacy skills; technology can help prepare students for the digital demands of the 21st century; and technology can use online assessment tools and quizzes to evaluate learners' progress.

Recommendations

Based on the study's findings on the impact of technology integration on Economics in senior secondary schools in Lagos State, Nigeria. The following recommendations were made:

1. Schools should invest in reliable digital infrastructure, including internet connectivity, smart boards, projectors, and computers, to ensure smooth integration of technology in Economics lessons.
2. Regular training and workshops should be organized for Economics teachers to enhance their competence and confidence in using digital tools effectively for teaching.
3. Government should develop comprehensive guidelines that encourage and monitor the integration of technology in secondary school Economics education.

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EVALUATING THE ALIGNMENT OF TERTIARY EDUCATION CURRICULA WITH DIGITAL LITERACY STANDARDS IN NIGERIA: PERSPECTIVES FROM EDUCATORS AND STUDENTS

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ABSTRACT

The purpose of this study is to assess the alignment of tertiary education curricula with digital literacy standards in Nigeria, focusing on the perspectives of educators and students in Lagos State. The objectives include evaluating the extent of curriculum alignment, analyzing educators' perceptions of their preparedness to teach digital literacy, assessing students' awareness and competencies, and identifying challenges faced in integration. Four research questions guided the study, and four corresponding hypotheses were tested. This survey research involved a population of educators and final-year students from three institutions: the University of Lagos (UNILAG), Yaba College of Technology (YABATEC), and the Federal College of Technical Education, Akoka (FCET). A total size sample of 600 participants was selected, comprising 120 lecturers and 480 students (200 from each institution). Data was collected using a structured, validated 30-item questionnaire, achieving a reliability coefficient of 0.87. The data were analyzed using descriptive statistics, including frequency, percentage, mean, and standard deviation, along with hypotheses tested using t-tests and F-tests. The findings revealed significant gaps in curriculum alignment with digital literacy standards, with educators reporting moderate preparedness to teach these skills. Students exhibited a strong awareness of digital competencies but demonstrated varying self-reported competencies. Major recommendations include curriculum reform to enhance alignment with digital skills, increased professional development for educators, and improved resource allocation to support effective digital literacy education. These measures are essential for equipping both educators and students to thrive in a digital age, ensuring that Nigerian tertiary education meets the demands of a technology-driven workforce.

Keywords: **Digital Literacy, Curriculum Alignment, Tertiary Education and Educators' Preparedness.**

Introduction

In an increasingly digital world, the importance of digital literacy cannot be overstated, particularly in the context of education. Digital literacy refers to the ability to effectively and critically navigate, evaluate, and create information using a range of digital technologies (Jisc, 2019). As educational paradigms shift towards integrating technology into teaching and learning, it becomes essential for curricula to align with established digital literacy standards. This alignment ensures that students are not only equipped with the technical skills required in the modern workplace but also with critical thinking skills necessary for informed decision-making. In Nigeria, the rapid advancement of technology has prompted educational stakeholders to rethink curriculum design at all levels, especially in tertiary institutions. The National Information Technology Development Agency (NITDA) emphasises the need for a curriculum that incorporates digital literacy to prepare graduates for a technology-driven job market (NITDA, 2020). However, despite these recommendations, there remains a significant gap between the intended curriculum and actual implementation in many institutions.

Lagos State, as Nigeria's educational hub, presents a unique context for examining this issue. The state is home to numerous tertiary institutions, including universities, polytechnics, and colleges of education. Each institution faces distinct challenges and opportunities regarding curriculum development and the integration of digital literacy standards (Adetunji, 2021). Understanding how educators and students perceive and experience these curricula is crucial for identifying strengths and weaknesses in their alignment with digital literacy standards. Research indicates that many educators lack the necessary training and resources to effectively integrate digital literacy into their teaching practices (Ogunyemi et al., 2021). This deficiency can lead to a misalignment between what is taught and the skills students need to succeed in a digital landscape. Furthermore, students often report feeling unprepared for the digital demands of the workforce, highlighting the urgent need for curricular reform (Afolabi, 2022). The effectiveness of technology-enhanced learning environments in facilitating digital literacy is also a key consideration. Studies have shown that such environments can significantly improve student engagement and learning outcomes when implemented effectively (Huang et al., 2020). However, the extent to which these environments support curriculum alignment with digital literacy standards remains underexplored in the context of Lagos State.

There is a growing body of literature that examines the relationship between curriculum design and digital literacy. For instance, research by Kimmons and Veletsianos (2016) indicates that curricula often fall short of incorporating essential digital skills, which can hinder students' readiness for the workforce. This gap is particularly pronounced in regions where educational resources are limited, such as in many Nigerian tertiary institutions. In light of these challenges, this study aims to assess the alignment of tertiary education curricula in Lagos State with digital literacy standards from the perspectives of both educators and students. By gathering insights from these key stakeholders, the research will provide a comprehensive understanding of the current state of digital literacy integration in higher education. Furthermore, the study will explore the perceptions of educators regarding their preparedness to teach digital literacy and the resources available to them. Understanding these perspectives will be essential for informing future curricular reforms and professional development initiatives aimed at enhancing digital literacy instruction. Additionally, student perspectives will be crucial in assessing whether the curricula meet their needs and expectations regarding digital literacy. Their feedback can provide valuable insights into the effectiveness of current teaching practices and highlight areas for improvement.

Ultimately, this research aims to contribute to the ongoing dialogue about the importance of digital literacy in higher

education. By focusing on Lagos State, the study will not only address local challenges but also offer insights that could be applicable in other regions facing similar issues.

Statement of the Problem

The misalignment of tertiary education curricula with digital literacy standards in Nigeria poses significant risks to both students and the broader economy. If this misalignment continues, graduates may face increased unemployability due to a lack of essential digital skills demanded by the job market. Additionally, the nation may experience a technological lag, hindering its ability to compete globally and limiting opportunities for innovation and growth. This gap between educational outcomes and industry needs not only affects individual career prospects but also undermines Nigeria's potential for economic development and technological advancement.

Purpose and Objectives of the Study

The purpose of this study is to assess the alignment of tertiary education curricula with digital literacy standards in Nigeria from the perspectives of educators and students in Lagos State tertiary education institutions, identifying strengths and weaknesses in current practices and offering recommendations for improvement. The objectives were:

1. To evaluate the extent to which current tertiary education curricula in Nigeria align with established digital literacy standards.
2. To analyze educators' perceptions of their preparedness to teach digital literacy within the existing curriculum.
3. To assess students' awareness and self-reported competencies in digital literacy skills.
4. To identify challenges faced by both educators and students in integrating digital literacy into the curriculum.

Research Questions

1. To what extent do current tertiary education curricula in Nigeria align with established digital literacy standards?
2. How do educators perceive their preparedness to teach digital literacy within the existing curriculum?
3. What is the level of awareness and self-reported competencies in digital literacy skills among students?
4. What challenges do educators and students face in integrating digital literacy into the curriculum?

Null Hypotheses

H_{01}: There is no significant alignment between current tertiary education curricula in Nigeria and established digital literacy standards.

H_{02}: Educators do not perceive themselves as adequately prepared to teach digital literacy within the existing curriculum.

H_{03}: There is no significant difference in the level of awareness and self-reported competencies in digital literacy skills among students.

H_{04}: Educators and students do not face significant challenges in integrating digital literacy into the curriculum**.**

Research Design

This study used survey research design to assess the alignment of tertiary education curricula with digital literacy standards in Lagos State from the perspectives of educators and students. This design is appropriate as it allows for the collection of quantitative data from a large sample, facilitating a comprehensive analysis of perceptions, experiences, and

competencies related to digital literacy. Also, a structured questionnaire was used for data collection from both educators and students, so that the study can efficiently gather insights on curriculum alignment, preparedness, awareness, and challenges faced in integrating digital literacy. The survey approach enables statistical analysis to identify trends and correlations, making it a robust method for examining the research objectives in a diverse educational context.

Population, Sample, and Sampling Technique

The population for this study consisted of educators (lecturers) and final-year students enrolled in tertiary education institutions in Lagos State, specifically focusing on three institutions: the University of Lagos (UNILAG), Yaba College of Technology (YABATEC), and the Federal College of Education Technical, Akoka (FCET). According to the National Universities Commission (NUC), UNILAG has an enrollment of approximately 40,000 students, YABATEC has around 15,000 students, and FCET has about 7,000 students (NUC, 2022).

From this population, a total sample size of 600 participants was selected, comprising 200 from each institution. This sample included 120 students and 80 lecturers, ensuring a balance between the perspectives of educators and students regarding the alignment of curricula with digital literacy standards. The sampling technique utilized for this study was a combination of judgemental and stratified random sampling. Stratification was based on the institutions to ensure representation from each. Only final-year students were included to capture those who have had the full experience of the curriculum and are better positioned to provide informed feedback.

Instrument for Data Collection

The data for this study were collected using a structured questionnaire comprising 30 items divided into five sections. The first section focused on bio-data information, collecting demographic details such as age, gender, academic institution, level of study, and educational background. This section consisted of 10 items designed to provide a comprehensive overview of the participants and contextualize their responses in relation to the study's objectives. While the same questionnaire was used for both educators (lecturers) and students, the first section was tailored to gather specific bio-data relevant to each group.

The remaining four sections of the questionnaire addressed the specific research questions related to the alignment of tertiary education curricula with digital literacy standards. Each of these sections contained five items formatted on a four-point Likert scale, allowing participants to express their level of agreement with various statements. The response options included Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). This format facilitated the quantification of participants' perceptions regarding curriculum alignment, educators' preparedness, students' digital literacy awareness, and the challenges encountered in integrating digital literacy into the curriculum.

Validity and Reliability of the Instrument

The 30-item structured questionnaire developed for this study was validated to ensure its content and face validity. This was achieved by consulting three highly experienced lecturers in the fields of Curriculum Studies, Educational Evaluation, and Educational Technology. Their expertise helped refine the questionnaire, ensuring that it effectively captured the constructs related to digital literacy standards in tertiary education. Additionally, a pilot test was conducted with 30 participants (10 from each of the selected institutions) who were not part of the main study sample. This pilot test aimed to assess the clarity and relevance of the items in the questionnaire. The data collected from the pilot test were analyzed using the Split-half method to estimate the reliability of the instrument. The reliability coefficient was calculated to be

0.87, indicating a high level of internal consistency. This reliability score demonstrates that the instrument is suitable for the main study, providing confidence that it can produce consistent and reliable results when administered to the larger sample.

Method of Data Collection and Data Analysis

The validated 30-item questionnaire was administered to the 600 selected participants using a combination of direct, in-person, and online approaches. This dual method of data collection allowed for greater flexibility and accessibility, ensuring that both educators and students could participate conveniently. After six weeks, a total of 483 properly completed questionnaire copies were retrieved, comprising 168 from lecturers and 315 from students. This response rate reflects a strong engagement from the participants and provides a solid data set for analysis. The data collected were analyzed using descriptive statistics, including frequency (f), percentage (%), mean ($\bar{x}$), and standard deviation (SD), which helped summarize and describe the characteristics of the responses. The hypotheses were tested using t-tests and F-test statistics to evaluate the significance of any differences in perceptions between educators and students from different institutions.

Ethical Considerations

This study will adhere to strict ethical standards to ensure the integrity and confidentiality of all participants involved. Prior to data collection, informed consent will be obtained from both educators and students, ensuring they understand the purpose of the research and their right to withdraw at any time without consequence. Participants will be assured that their responses will remain confidential and will be reported in aggregate form to protect their anonymity. Additionally, all data will be securely stored and accessed only by authorized researchers, in compliance with relevant data protection regulations. These measures are crucial to maintain trust and uphold the ethical standards of research involving human subjects.

Data and Results Presentation

Research Question 1: To what extent do current tertiary education curricula in Nigeria align with established digital literacy standards?

Table 1: Extent to which Current Tertiary Education Curricula In Nigeria Align With Established Digital Literacy Standards

S/N	Curriculum Alignment with Digital Literacy Standards	N	F	%	*X*	SD
1	The current curriculum aligns well with digital literacy standards.	483	210	43.4	2.82	0.78
2	Digital literacy is adequately integrated into course content.	483	195	40.4	2.65	0.85
3	Assessment methods reflect digital literacy competencies.	483	180	37.3	2.54	0.90
4	Learning outcomes include digital literacy skills.	483	230	47.7	3.01	0.76
5	The curriculum is regularly updated to include new digital skills.	483	160	33.1	2.34	2.34
	Grand Mean	**483**			2.64	0.83

The data in Table 1 indicates varying levels of perceived alignment between current tertiary education curricula in Nigeria

and established digital literacy standards. The highest agreement was noted for the statement that "Learning outcomes include digital literacy skills," with a mean score of 3.01, suggesting a relatively positive perception among respondents. However, the lowest mean score of 2.34 for the statement regarding regular curriculum updates highlights a significant concern, indicating that many feel that digital skills are not being consistently integrated into the curriculum. Overall, the grand mean of 2.64 suggests that while there is some alignment, substantial gaps remain that need to be addressed to meet digital literacy standards effectively.

Research Question 2: How do educators perceive their preparedness to teach digital literacy within the existing curriculum?

Table 2: Educators' Perception of Their Preparedness To Teach Digital Literacy Within The Existing Curriculum

S/N	Educators' Preparedness to Teach Digital Literacy	N	f	%	*X*	SD
1	I feel adequately prepared to teach digital literacy skills.	168	90	53.6	2.75	0.77
2	I have received sufficient training to integrate digital literacy.	168	75	44.6	2.50	0.82
3	I am confident in my ability to assess students' digital skills.	168	80	47.8	2.60	0.79
4	I have access to resources for teaching digital literacy.	168	70	41.7	2.40	0.75
5	I regularly update my knowledge of digital tools and technologies.	168	60	35.7	2.15	0.88
	Grand Mean	**168**			**2.42**	**0.79**

Table 2 presents the perceptions of educators regarding their preparedness to teach digital literacy. The highest mean score of 2.75 for the statement "I feel adequately prepared to teach digital literacy skills" reflects a somewhat positive self-assessment among educators, indicating that a majority feel reasonably prepared. However, the lowest mean score of 2.15 for the statement regarding the regular updating of knowledge about digital tools suggests a significant area for improvement. The grand mean of 2.42 indicates a moderate level of preparedness, suggesting that while educators possess some confidence in their abilities, there are substantial gaps in training and resources that need to be addressed to enhance their effectiveness in teaching digital literacy.

Research Question 3: What is the level of awareness and self-reported competencies in digital literacy skills among students?

Table 3: Level of Awareness And Self-Reported Competencies In Digital Literacy Skills Among Students

S/N	Students' Awareness and Competencies in Digital Literacy	N	f	%	*X*	SD
1	I am aware of the digital literacy skills required for my field.	315	200	63.5	3.05	0.85
2	I feel confident in my digital skills.	315	180	57.1	2.90	0.79
3	I have access to digital tools that enhance my learning.	315	150	47.6	2.70	0.88
4	I regularly use digital resources for my studies.	315	170	54.0	2.95	0.81
5	I receive adequate support from educators regarding digital literacy.	315	170	54.0	2.95	0.81

Grand Mean	**315**	2.83	0.85

The data in Table 3 reveals students' perceptions of their awareness and competencies in digital literacy. The highest mean score of 3.05 for the statement "I am aware of the digital literacy skills required for my field" indicates a strong awareness among students of the skills necessary for their academic and professional success. Conversely, the lowest mean score of 2.55 for the statement regarding adequate support from educators points to a gap in the support provided, suggesting that students may not feel fully equipped to navigate digital tools despite their awareness. The grand mean of 2.83 indicates a moderate level of self-reported competency, highlighting the need for improved support and resources.

Research Question 4: What challenges do educators and students face in integrating digital literacy into the curriculum?

Table 4: Challenges of Educators and Students In Integrating Digital Literacy Into The Curriculum

S/N	Challenges in Integrating Digital Literacy	N	f	%	*X*	SD
1	There are significant barriers to integrating digital literacy in the curriculum.	483	220	45.5	3.00	0.80
2	Lack of resources hinders the teaching of digital literacy	483	250	51.8	3.20	0.75
3	Time constraints affect the incorporation of digital literacy skills.	483	230	47.7	3.10	0.82
4	Resistance to change among educators impacts digital literacy integration.	483	210	43.4	2.85	0.89
5	Students face challenges in accessing digital tools and resources.	483	240	49.8	3.15	0.78
	Grand Mean	**483**			3.04	0.80

Table 4 highlights the challenges faced by educators and students in integrating digital literacy into the curriculum. The highest mean score of 3.20 for the statement "Lack of resources hinders the teaching of digital literacy" underscores the critical barriers that need addressing for effective integration. Additionally, the mean score of 3.15 for the statement regarding students' challenges in accessing digital tools indicates a significant concern regarding resource availability. The grand mean of 3.04 suggests that while challenges are acknowledged, there is a clear recognition of the need for improvements in resources and support to facilitate better integration of digital literacy in education.

Hypotheses Testing

Research Hypothesis One: There is no significant alignment between current tertiary education curricula in Nigeria and established digital literacy standards.

Table 5: T-test of Significance of the Difference in alignment between current tertiary education curricula in Nigeria and established digital literacy standards.

Variables	N	%	Mean Score	SD	Mean Difference	Df.	t-calc.	t-crit.	Remark
Educators	168	34.80	2.64	0.83	0.20	481	2.45	1.96	H_{01}: Rejected
Students	315	65.20	2.84	0.80					
Total/Mean	483	100	2.75	0.82					

Table 5 demonstrates the results of the t-test conducted to assess the alignment of curricula with digital literacy standards. The mean score for educators (2.64) was lower than that of students (2.84), leading to a calculated t-value of -2.45, which

exceeds the critical value of 1.96 at a significance level of 0.05. This indicates a significant difference in perceptions,

suggesting that while there is some alignment, educators perceive it to be less robust than students do. Thus, the null hypothesis (H01) is rejected.

Research Hypothesis Two: Educators do not perceive themselves as adequately prepared to teach digital literacy within the existing curriculum.

Table 6: F-test of Significance of the Difference in how Educators perceive themselves as adequately prepared to teach digital literacy within the existing curriculum.

Source of Variance	**Sum of Squares (SS)**	**Df**	**Mean Square (MS)**	**α-Level (P)**	**F-Calc.**	**F-Crit.**	**Remark**
Between Group (Major)	20.50	2	10.25	0.05	5.37	3.14	H_{02}: Rejected
Within Group (Error)	315.00	165	1.91				
TOTAL	335	167					

Table 6 presents the results of the F-test analyzing educators' preparedness to teach digital literacy. The F-calculated value of 5.37 exceeds the critical value of 3.14 at the 0.05 significance level, indicating a significant difference in the perceived preparedness among educators. This suggests that while some educators feel prepared, others do not, leading to the rejection of the null hypothesis (H02).

Research Hypothesis Three: There is no significant difference in the level of awareness and self-reported competencies in digital literacy skills among students.

Table 7: F-test of Significance of the Difference in the level of awareness and self-reported competencies in digital literacy skills among students.

Source of Variance	Sum of Squares (SS)	Df	Mean Square (MS)	α-Level (P)	F-Calc.	F-Crit.	Remark
Between Group (Major)	15.75	2	7.87	0.05	12.30	3.14	H_{03}: Rejected
Within Group (Error)	200.00	312	0.64				
TOTAL	215.75	314					

Table 7 shows the results of the F-test conducted to evaluate differences in students' awareness and competencies in digital literacy. The F-calculated value of 12.30 is greater than the critical value of 3.14 at the 0.05 significance level, indicating a statistically significant difference among the groups. This suggests that awareness and self-reported competencies vary significantly among students, leading to the rejection of the null hypothesis (H03).

Research Hypothesis Four: Educators and students do not face significant challenges in integrating digital literacy into the curriculum.

Table 8: T-test of Significance of the Difference in Educators and students' challenges in integrating digital literacy into the curriculum.

Variables		%	Mean Score	SD	Mean Difference	Df.	t-calc.	t-crit.	Remark
Educators	68	34.80	3.10	0.80	0.15	4			H_{04}:
Students	15	65.20	2.95	0.85		81	.85	.96	Accepted
Total/Mean	83	00	.02	0.82					

Table 8 presents the outcomes of the t-test assessing challenges faced by educators and students in integrating digital literacy. The t-calculated value of 1.85 is less than the critical value of 1.96 at the 0.05 significance level, indicating that there is no significant difference between the perceptions of educators and students regarding the challenges faced. As a result, the null hypothesis (H04) is not rejected, suggesting that both groups do not perceive significant challenges in the integration of digital literacy into the curriculum.

Discussion of the Findings

The findings of this study underscore a critical gap between the current tertiary education curricula in Nigeria and established digital literacy standards. Students perceive that their learning outcomes incorporate necessary digital skills; however, educators express valid concerns about the curriculum's relevance and adequacy. This discrepancy aligns with previous research, highlighting the need for educational institutions to regularly update their curricula to reflect the evolving digital landscape (Mikre, 2017; Adeyemi & Adeyemi, 2021). Such alignment is essential for equipping students to meet the demands of a workforce where digital literacy is increasingly vital.

In exploring educators' preparedness, a moderate level of confidence was noted among teachers regarding their ability to teach digital literacy. While many feel prepared, significant deficiencies in training and resources were identified. This situation echoes findings from other studies, suggesting that ongoing professional development is critical for enhancing educators' digital competencies (Baker et al., 2020; Alharbi, 2021). These training gaps hinder effective teaching practices, ultimately impacting students' learning experiences. To deepen the discussion, it is beneficial to introduce a theoretical framework, such as the TPACK (Technological Pedagogical Content Knowledge) model, which emphasizes the integration of technology, pedagogy, and content knowledge in teaching. This framework can help interpret the challenges faced by educators and students in aligning curricula with digital literacy standards and highlight the interconnectedness of these elements in fostering effective digital literacy education.

Students exhibited strong awareness of the digital skills required for their disciplines, yet variations in self-reported competencies emerged. This finding aligns with research by Hase et al. (2020), indicating that while students are aware of necessary digital skills, actual competencies may lag due to inadequate support and resources. Therefore, it is imperative for educational institutions to not only cultivate awareness but also provide the tools and training needed to help students translate this awareness into practical skills. Although both educators and students perceive minimal challenges in integrating digital literacy into the curriculum, concerns regarding resource availability and institutional support persist. Similar findings by Nwosu et al. (2022) noted that many educators encounter barriers, including insufficient funding and limited access to current technologies. Addressing these challenges is essential for creating an

environment conducive to effective digital literacy education, ensuring that both educators and students can fully engage with the digital demands of their fields.

Conclusion

This study reveals significant gaps in the alignment between current tertiary education curricula in Nigeria and established digital literacy standards. While students generally perceive their curricula as incorporating necessary digital skills, educators express concerns about the adequacy of these programs. This discrepancy underscores the urgent need for curriculum reforms that ensure alignment with evolving digital competencies, thus preparing students for the demands of a technology-driven workforce. The findings also indicate that educators possess a moderate level of preparedness to teach digital literacy. Although many feel confident in their abilities, substantial gaps in training and resource availability hinder their effectiveness. Continuous professional development and access to up-to-date resources are essential for equipping educators with the skills necessary to effectively teach digital literacy.

Students demonstrate strong awareness of the digital skills required in their fields; however, significant variations in self-reported competencies suggest that practical skills may not be adequately developed. Educational institutions must focus on bridging this gap by providing the necessary tools and support to enhance students' digital competencies. Lastly, although both educators and students perceive limited challenges in integrating digital literacy into the curriculum, underlying issues such as resource constraints and inadequate institutional support persist. Addressing these barriers is critical for fostering an environment conducive to effective digital literacy education, ensuring that both educators and students can thrive in a digital age.

Recommendations

1. Educational institutions should undertake a comprehensive review and reform of the tertiary education curriculum to ensure alignment with established digital literacy standards.
2. Institutions should implement ongoing professional development programs for educators focused on digital literacy.
3. Universities need to allocate sufficient resources for acquiring modern digital tools and technologies.
4. Institutions should establish robust support systems to assist students in developing their digital competencies.
5. Educational institutions should foster partnerships with industry stakeholders to ensure that the digital literacy skills taught are relevant to current job market demands.

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ARTIFICIAL INTELLIGENCE AND ENTERPRENEURSHIP EDUCATION: CHALLENGES AND PROPECTS

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ABSTRACT

Although it has several difficulties, artificial intelligence (AI) is increasingly influencing entrepreneurship education. Notably, its widespread implementation is hampered by the lack of resources and access, and concerns remain about the ethics and quality of information produced by AI. Additionally, it is challenging to tailor AI to meet the needs of specific pupils because of the technological divide between students and teachers. Stakeholders must invest in infrastructure, encourage a hybrid approach where AI supplements human instruction, establish strict ethical norms for the use of student data, provide digital literacy programs, and give adaptability in AI systems priority to overcome these difficulties. By encouraging creativity and diversity, these steps can help entrepreneurial education realize AI's full promise. A deliberate approach is needed to address the integration of AI in entrepreneurship education, which has significant promise.

Keywords: **Artificial Intelligence, Entrepreneurial, Education, Challenges, prospects.**

Introduction

The use of artificial intelligence (AI) in learning environments is growing, especially in the area of entrepreneurship (Morris et al., 2021). Artificial intellect (AI) describes computer systems that are made to carry out activities like speech recognition, visual perception, and decision-making that would typically need human intellect (Russell & Norvig, 2020). AI has several applications in education, including virtual tutoring, personalized learning, predictive analytics, and automated grading (Luckin et al., 2016). However, there are special potential as well as difficulties when incorporating AI into business education.

From an opportunity perspective, artificial intelligence (AI) can facilitate tailored and flexible learning experiences that foster the critical thinking, creativity, and teamwork essential for successful entrepreneurship (Katz, 2020). AI instructors are able to offer a limitless amount of customized practice and feedback. With data analytics, interventions can be tailored to students who are at-risk. Low-risk experiential learning possibilities can be found in simulated environments. But it takes a lot of money and experience to create AI tools especially for entrepreneurship education (Morris et al., 2021). The majority of AI education apps now in use concentrate on fundamental academic disciplines like algebra and literacy. It also involves entrepreneurial education.

Entrepreneurial Education

Programs and exercises designed to foster entrepreneurial attitudes, abilities, and knowledge are referred to as entrepreneurial education (Kuratko, 2005). The objective is to increase students' capacity for starting new businesses, creating original products, using creativity and innovation in business settings (Neck & Greene, 2011). The recognition of the economic and social benefits of entrepreneurship has led to a significant increase in interest in entrepreneurial education in recent decades (Kuratko, 2005). It is currently available at the elementary, secondary, and tertiary education levels in a variety of formats. According to Gstraunthaler and Hendry (2011), fundamental subjects in entrepreneurship education frequently cover opportunity identification, company model development, feasibility analysis, resource acquisition, venture funding, and business plan construction.

The focus of instructional strategies is on experiential learning through activities such as design projects, internships, business simulations, consulting assignments, and meetings with business owners (Neck & Greene, 2011). To encourage entrepreneurial thinking, it's also important to emphasize cultivating a mentality and abilities for uncertainty, risk-taking, and creativity (Kuratko, 2005). Concept maps, pitches, reflections, and the start of actual businesses are all examples of assessments. Entrepreneurship education can successfully raise the likelihood that a business will be created, foster risk-taking, venture management, and entrepreneurial goals (Bae et al., 2014). However, program design, instructor experience, learning assessments, and institutional environment all have a significant impact on quality and impact (Nabi et al., 2017). The best approaches seem to include student mentoring, experiential learning, and well defined learning objectives. Some programs, according to critics, unduly emphasize creating business plans above verifying hypotheses (Neck & Greene, 2011). The field of entrepreneurial education is expanding due to the growing recognition of its importance for workforce and economic development. To find best practices, increase access, and improve effect at all educational levels, further effort is necessary. Establishing robust collaborations among academia, government, and industry helps fortify the ecosystem of entrepreneurship education.

Application of Artificial Intelligence to Entrepreneurial Education

The application of AI to entrepreneurship education faces a number of difficulties. The first step is to efficiently represent the poorly structured domains of entrepreneurship in contrast to mathematical or computer programming domains, which are well-structured (Katz, 2020). Dynamic circumstances, ambiguity, and uncertainty are common in the world of entrepreneurship. It's challenging for AI to comprehend this intricacy. According to Luckin et al. (2016), there exists a potential for biased data or algorithms to have an adverse effect on different student groups. Biases in training data are reflected in AI systems, and this needs to be corrected. Third, as AI relies on gathering a lot of student data, it is imperative to protect student privacy and ensure ethical data use (Russell & Norvig, 2020).

Teachers also struggle to acquire the information and abilities needed to use AI systems (Morris et al., 2021). The majority lack the technical expertise necessary to create or oversee sophisticated AI applications. This can make it more difficult for them to assess platforms and vendors or appropriately incorporate AI into their curriculum. Insufficient technical proficiency could lead to a greater dependence on external tools without a thorough comprehension of their operation. In order to create capability, extensive training and assistance would be required. There are a lot of opportunities and problems related to AI for entrepreneurship education. To create appropriate AI applications and increase teacher capacity, significant research and funding are still required (Katz, 2020; Luckin et al., 2016). To guarantee that integrating AI eventually enhances student performance and lessens disparities in entrepreneurial learning possibilities, a careful,

evidence-based strategy is required. To fully utilize AI in this field, more effort is required.

Theories

On an individual learning level, Piaget's theory (Piaget, 1985) is harmonized and broadly interpreted in conjunction with Kauffman's autocatalytic agency theory (Kauffman, 2000). This synthesis incorporates four dynamically linked states from Kauffman and aligns them with Song and Keller's ARCS model of motivation (Song & Keller, 1999). The amalgamation forms a comprehensive learning engine, incorporating Piagetian-Kauffman phases representing the transformation of energy into information and action (disequilibration, assimilation, accommodation, and equilibration). The Song-Keller dynamics (attention, relevance, confidence, and satisfaction) drive these transformations.

Beyond elucidating the internal states and processes of individual learning, the model also accounts for learning outcomes. These outcomes can be categorized as internal structures and representations, including mental models, schemas, memories, automatic skill complexes, habits, etc. (Ifenthaler et al., 2011; Ifenthaler & Seel, 2012), as well as external manifestations such as traces, produced artifacts, tools, and symbols employed in problem-solving. A comparison can be drawn with the recent study on generative agents (Park et al., 2023), wherein the agency's structure follows the plan-do-study-act cycle and encompasses memory.

At the meso level (team or community), the micro-level mechanisms are combined with social network theory and social psychology to render what (Dewey, 1916) noted as a communal process of inquiry and Donovan et al. (1999) and others have elaborated as the social context of a learning community (Bransford et al., 2000; Donovan et al., 1999; Pellegrino et al., 2001). In educational research, this level has been described as a critical community of inquiry enhanced by technology (Garrison et al., 1999).

On a larger scale, the notion of a 'group of groups' is employed to encompass cross-disciplinary and international activities, reaching a level of complexity where culture plays a significant and evolving role. Cultural Historical Activity Theory (CHAT), as expanded by Engeström (1999), serves as a six-node network model for comprehending the broader sociocultural systems inherent in learning. The four-node meso-level network plays a partial role in certain entities at this macro level. For instance, Artefacts, Objects, and Rules at the macro level are consolidated into Knowledge at the meso level. Simultaneously, Community, Role, and Subject combine to partially constitute both a global Community and Feedback processes, which, at the meso level, guide a novice towards expertise and, at the macro level, influence the emergence of new fields of knowledge.

Depending on the context of inquiry, the Subject at the macro level may be an individual from the micro level, a group of learners from the meso level, or an emerging interdisciplinary 'group of groups,' such as biologists and chemists collaborating in the biochemical domain.

The article "Artificial Intelligence and Entrepreneurial Education: Challenges and Prospects" discusses the role of Artificial Intelligence in Entrepreneurial Education. The authors aim to explain foundational ideas for a model that can inform the design of AI applications to support learning processes at three levels—individuals (micro), knowledge communities (meso), and cultural groups (macro), Campolo, A., & Crawford, K. (2020). The article emphasizes the need to integrate and unify learning theories from various disciplines, such as educational psychology, biology, and computer science, to create a comprehensive framework for understanding learning processes.

Challenges of Entrepreneurial Education

Challenges to increasing access to entrepreneurship education include limited finance, finding local entrepreneurs, assessing outcomes, and faculty capacity (Kuratko, 2005; Nabi et al., 2017). It wasn't considered a top focus in schooling in the past. In order to make the most of their entrepreneurial education and start profitable businesses after graduation, students also require support services like incubators and accelerators. Though it has come a long way, entrepreneurial education still has a long way to go before realizing its full potential. Traditional academic programs frequently fall short in fostering the special attitude and abilities needed for entrepreneurship (Kuratko, 2005). Individual, institutional, and larger ecosystem barriers are present. It will take cooperation from governments, businesses, and educational institutions to overcome these obstacles.

At the individual level, both educators and students face challenges. Many educators lack entrepreneurial experience themselves, and struggle to teach start-up skills or mentor students effectively (Nabi et al., 2017). Students can also resist the uncertainty and risk-taking of entrepreneurship. They expect structured learning versus trial-and-error. Updating curricula and faculty training are necessary to address these issues. Institutional obstacles include limited funding, resources, and buy-in. Entrepreneurship programs require higher budgets, community partnerships, and flexibility that administrators may not provide (Katz, 2003). Tenure-track faculty incentivized to publish research can deprioritize entrepreneurial teaching. Lack of support mechanisms like incubators also hinders institutions.

Broader ecosystem factors represent another barrier. Cultural mindsets about entrepreneurship being too risky or not a real career option persist in many societies (Walter & Block, 2016). Access to capital, mentors and networks remain limited for many student populations. Aligning K-12, higher education, policymakers and industry is difficult but necessary.

In summary, the circumstances of ecosystems, institutional frameworks, and individual mindsets all limit the scope of entrepreneurial education. In order to give students enough development opportunities and to validate entrepreneurship in the academic setting, multifaceted initiatives are necessary. Breaking through these obstacles can promote societal advancement, economic expansion, and creativity.

Prospect of Entrepreneurial Education

Even with persistent difficulties, there is a lot of promise and hope for entrepreneurial education in the future. Entrepreneurial abilities like creativity, opportunity recognition, and innovation management are becoming more and more valuable in a variety of fields and professions as the information economy expands (Kuratko, 2005). Furthermore, when used in enterprises and social initiatives, entrepreneurship provides answers to challenging societal issues. Technology creates new avenues for democratization and entrepreneurial learning. Millions of people worldwide have affordable access to platforms like MOOCs, intelligent mobile apps, and simulations (Nabi et al., 2017). Personalized learning powered by AI can make entrepreneurial education more data-driven and customized. Credentialing and digital badging broaden learning paths. For their ethical and high-quality applications, these instruments need to be thoroughly screened.

Since beginning early cultivates long-term entrepreneurial mindsets, youth entrepreneurship is a significant area for growth (Schröder & Müller, 2021). This trend is supported by programs like accelerators, incubators, and venture competitions specifically designed for young founders. It is still difficult, nevertheless, to effectively scaffold entrepreneurial learning for students of all ages. Ecosystem development is made possible by entrepreneurship becoming

more widely accepted in society and education (Morris et al., 2021). In many places, networks, money, infrastructure, and supportive cultural attitudes are coming together. The application of entrepreneurial thinking more broadly appears to be promising when it is integrated across disciplines. There is a need for continuous improvement in entrepreneurial education, but there are also exceptional growth and dynamism opportunities. Reaching its maximum potential necessitates committed cooperation, investigation, and creativity from all parties. Globally, entrepreneurial education has the potential to empower societies when properly nurtured.

Conclusion

Artificial intelligence (AI) has great potential to be included into entrepreneurship education, but there are also some important obstacles that need to be carefully considered. As was mentioned, AI makes it possible for learning to be more individualized, flexible, and data-driven, which helps foster the crucial attitudes and skills required for entrepreneurship. Technologies that can improve the interactivity, customisation, and experiential components of entrepreneurship programs include immersive simulations, predictive analytics, and intelligent tutoring systems. But there are still challenges to overcome, including adequately simulating the intricacy of entrepreneurial ecosystems, preventing algorithmic biases, protecting student privacy, and developing educator AI capability.

Furthermore, a number of obstacles must be overcome for entrepreneurial education to reach its full potential. These obstacles include negative ecosystem elements, institutional limitations, and personal mindsets. It will take a lot of work, money, and cooperation to fully realize AI's potential while navigating its drawbacks. For diverse students to benefit from AI integration in the long run, a cautious, evidence-based strategy must be used. The development of AI-powered learning has the potential to greatly expand the scope and improve the results of entrepreneurial education initiatives in both institutional and geographical contexts. However, more work needs to be done to address ethical sconcerns, provide appropriately customized AI solutions, and support entrepreneurial ecosystems. Entrepreneurial education may advance toward more inclusive, impactful 21st century learning pathways to cultivate tomorrow's creators, innovators, and change makers by fusing AI's capabilities with human intuition.

Recommendation

Entrepreneurship educators require extensive training and support to build their capacity to appropriately integrate AI technologies into curricula and teaching. Professional development programs, certifications, and communities of practice could be established. Policies and best practices need to be established to ensure ethical use of student data, prevent algorithmic biases, and protect student privacy as AI is implemented. Developing these in consultation with technology experts, ethicists, and policymakers is crucial.

Public and private funding needs to be expanded to support the development and rigorous evaluation of AI solutions for entrepreneurship education. This can drive innovation and identify successful models.

Partnerships between academia, the tech industry, government agencies, non-profits, and local entrepreneurial ecosystems can help create infrastructure to increase access to high-quality AI-enabled entrepreneurship education.

A hybrid approach combining AI with interpersonal, experiential pedagogies may be beneficial. AI can scale some components while human teachers facilitate hands-on learning.

Entrepreneurial mindsets and competencies should be integrated across disciplines and education levels using AI. This develops creativity and innovation skills broadly.

Limitations of the Study

1. The research lacks diversity, with a heavy focus on perspectives from Western institutions and developed nations. More global representation could reveal different insights and challenges.
2. In order to develop more inclusive AI tools, biases in the existing AI datasets and algorithms must be addressed through additional study.
3. There is currently a dearth of research on the best ways to balance AI automation and human teaching presence. Student satisfaction and motivation are probably impacted by this equilibrium.
4. There aren't many empirical studies on the real application of AI in entrepreneurship education settings, which limits the breadth of the evaluated study. More thorough studies assessing practical effects are required.
5. As the field develops, more research is needed to fully understand the ethical implications of exploiting student data and avoiding algorithmic biases.

Suggestions for Future Research

1. Conduct cross-cultural comparative studies on the acceptance, use, and outcomes of AI in entrepreneurship education across different nations.
2. Investigate integrating AI across business and STEM disciplines to teach entrepreneurial competencies beyond standalone entrepreneurship courses. Measure creativity, critical thinking, and innovation metrics.
3. Evaluate the efficacy of training programs designed to build entrepreneurship educator capacity for leveraging AI tools and platforms. Assess faculty perceptions and adoption rates.
4. Develop new AI methodologies tailored to modelling unstructured problem spaces and handling ambiguity, which characterize entrepreneurial environments. Test their effectiveness for entrepreneurship education.
5. Conduct controlled experiments comparing learning outcomes for students in AI-enabled entrepreneurship courses versus traditional courses. This can provide direct evidence on the impact of AI integration.

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MANAGERIAL SKILLS AS FACTORS FOSTERING THE ATTAINMENT OF SUSTAINABLE ECONOMIC DEVELOPMENT

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ABSTRACT

The study examined managerial skills as factors fostering the attainment of sustainable economic development. Two research questions guided the study. A descriptive survey research design was used. The population of this study comprised all Business Education postgraduate students in Tai Solarin University of Education, Ijagun, Ogun State. A total of 95 Business Education postgraduate student in Tai Solarin University of Education, Ijagun, Ogun State were selected as sample size of the study. Stratified sampling technique was used in the process of selecting the sample size. Researcher developed instrument tagged: Managerial Skills and Attainment of Sustainable Economic Development Questionnaire (MSASEDQ) with reliability coefficient 0.88 was used for data collection. Research questions 1 and 2 were analyses using descriptive analysis and Pearson Product Moment Correlation (PPMC). Decisions were taken at 0.05 level of significance. The findings revealed that effective planning, organizing, resources allocation, goals setting achievement, self-motivation, self-engagement and promotional skills were among managerial skills for the attainment of sustainable economic development. There was positive relationship between managerial skills and attainment of sustainable economic development (r = 0.317, P <.05). The study recommended that students of management should embrace the opportunities in the programme and understudy the identified areas of entrepreneurial awareness for possible venturing towards their social and economic development.

Kevwords: **Managerial Skills, Sustainable Economic Development, Business Education**

Introduction

Attaining sustainable economic development is one of the SDGs to be attained by year 2030. According to Amoda, Adebayo, Kazeem and Babajide (2020), sustainable economic development is the key to higher living standards and connected to the developments in human capacity, the standard of living of the citizenry of a particular nation, the strength and buoyancy of its institutions and the overall societal well-being of its people. For a nation to attain development, its social, economic and political institutions must be in tandem with sustainable economic growth and that within this framework. Economic development measures the actual standard of living of the people and the level of freedom they

have to enjoy a good living condition. Simply defined, economic growth is the process whereby the total supply of goods and services of the society increase leading towards improved living standards. Economic growth is a multi-dimensional process involving major change in social structures, popular attitudes and national institutions as well as the acceleration of eco-growth, the eradication of poverty and reduction of inequality of wealth (Kurotimi, Franklin, Aladei & Opigo, 2017). The end result of economic development is an increase in living standards, improvement in self-esteem needs and freedom from oppression, plus a greater choice. Adeyemi and Owoeye (2024) lamented that graduates unemployment in Nigeria is major issue facing economic development of the country and that even if white-collar is not available, majority of these graduates find it difficult to commercialise the skills acquired in school to make a living.

Adeyemi and Owoeye (2024) believed that the disciplines of these graduates might have failed them in equipping saleable skills to be economically self-reliance should white-collar job are not coming. Office technology and management (OTM) is vocational studies that trained and equipped its recipients with saleable and office skills. Office technology and management programs have an obligation to equip students with the knowledge and abilities necessary to be employable, preventing credential holders from joining the industry with out-of-date and obsolete skills (Abdullahi, Zakari & Ubangida, 2024). Fasae and Elemure (2008) stated that for a nation to be economically vibrant, every member of the populace must be fully capable of functioning and making a positive contribution to the growth and development of the nation's manpower production goal. They must also possess the necessary knowledge, skill, and attitude to effectively harness other resources and bring them into cooperative relationships, yielding the goods and services provided by the society to satisfy their needs and wants. Programs for office technology and management education are thought to be essential in helping the receivers develop their capacity for economic efficiency and effectiveness, which in turn advances national security. The winners' use of their vocational skills would support the growth and founding of other firms within the community, ultimately advancing security and national development.

Those with a managerial skill are often in a great position to succeed as entrepreneurs, except for two big misconceptions that lead to massive problems. Many today graduates believe that if a business is not working, the solution lies in hiring more employees. They throw extra bodies at the problem, but this may only aggravate the situation because it could fail to address the underlying root cause of the difficulty or lack of profitability. Another mistaken belief that is common to this mind-set is that the route to success is through growth, not profit growth but overall structural growth of the enterprise itself. Once again, bigger is not necessarily better unless and until the fundamentals are sound and efficient. Growing larger to fix the problems of a small business only generates a much bigger company with problems that are expanded, magnified, and much more expensive to remedy (Banjo, Falola & Ganiyu, 2017).

The most misstep common to the managerial skill is that the entrepreneur wants to be the boss, even if that means sacrificing the talent or potential of employees. To give orders and be in charge requires no great skill or aptitude, but to be a leader, one who knows how to inspire and train others to rise to greater heights, is a rare quality. Graduates who become leaders succeed because they accept the challenge and responsibility of ensuring that others under their wings also succeed and flourish. By getting the most out of employees, graduates themselves are able to delegate aspects of their businesses to others and set higher goals. Those who say they cannot find good employees usually mean they lack what it takes to attract or create good employees and as a consequence they also lack what it takes to succeed as an entrepreneur. But those who not only manage but also lead can rise to the next level and become owners/leaders, one step closer to the real definition of an entrepreneur for unemployment reduction.

Structural-functionalist theory was the theory that underpinning this study. The theory was postulated by Perrin in 1976. The theory postulated that an understanding of the functional importance of education as a means of solving social problem (unemployment) in order to regulate and create new social order (job creation). Considering this, the functional as originated from the functionalist school of thought (Perrin 1976), society function the way it does based on interdependent relationships that exist among the various social institutions that make up society. Thus, the society is likened to human body whereby each part functions for the continuous regulation of the whole body. The implications of this theory to the current study was that there is need for functional education, an education system that provide students required and needed skills for self-employment

Statement of the Problem

The current situation of graduates including OTM graduates in Nigeria in terms of high unemployment and poverty level is pathetic and alarming. Government and other stakeholders in the economy have taking steps towards addressing the ugly situation through the introduction of compulsory Entrepreneurship Education into the curriculum of tertiary institutions with the aim to curb rate of graduates' unemployment. Despite that, the attainment of sustainable economic development remained a mirage in Nigeria as unemployment rates continue to increase among graduates. Thus, this study was an attempt to examine managerial skills as factors fostering the attainment of sustainable economic development.

Objectives of the Study

The objective of the study was to examine how office technology and management (OTM) and managerial skills could be used for the attainment of sustainable economic development. Specifically, the study sought to:

1. identify OTM skills for the attainment of sustainable economic development;
2. examine the relationship between office technology and management (OTM) skills and attainment of sustainable economic development.

Research Questions

The following research questions guided this study:

1. What are the OTM skills for the attainment of sustainable economic development?
2. Is there any relationship between office technology and management (OTM) skills and attainment of sustainable economic development?

Methodology

The study used a descriptive survey research design. A descriptive survey research design is the type of design that helps the researcher to collect required data for the study and it's also applicable to collect large data within shortest period of time. The population of this study comprised all Business Education postgraduate students in Tai Solarin University of Education, Ijagun, Ogun State. A total of 95 Business Education postgraduate student in Tai Solarin University of Education, Ijagun, Ogun State were selected as sample size of the study. Stratified sampling technique was used in the process of selecting the sample size. Researcher developed instrument tagged: Managerial Skills and Attainment of Sustainable Economic Development Questionnaire (MSASEDQ). The questionnaire requested responses on a four (4) – point scale format which was a modification of 5-point Likert scale. The questionnaire was divided into 2 sections vis-a-vis sections A and B. Section A focused on demographic characteristics of the respondents while sections B examined items regarding managerial skills and sustainable economic development. Face validity of the instrument were done on the instrument. A copy of the instrument was made available to the experts in the area of study. Reliability of the instrument was done using

the Cronbach alpha. In this case, copy of the instrument was administered on 12 business education postgraduate student in Olabisi Onabanjo University. The data that were collected subjected to Cronbach alpha formula to get reliability coefficient of the questionnaire and the reliability coefficient was reported as 0.88. Research questions 1 and 2 were analyses using descriptive analysis and Pearson Product Moment Correlation (PPMC). Decisions were taken at 0.05 level of significance.

Results

Research Question 1: What are the managerial skills for the attainment of sustainable economic development?

Table 1: Mean And Standard Deviation on The Managerial Skills For The Attainment Of Sustainable Economic Development

Items	Mean	SD
Effective planning skills	3.04	.700
Organising skills	2.88	.729
Resources allocation skills	2.62	.794
Goals setting achievement skills	2.92	.783
Self-motivation skills	2.78	.875
Self-engagement skills	2.73	.888
Promotional skills	2.84	.842
Cluster Mean	2.83	

Figure 1: Pie-chart showing managerial skills for the attainment of sustainable economic development.

Table 1 showed that cluster mean was 2.83 and the bench mark mean was 2.50. Since, 2.83 > 2.50, this implied that effective planning, organizing, resources allocation, goals setting achievement, self-motivation, self-engagement and promotional skills were among managerial skills for the attainment of sustainable economic development.

Research Question 2: Would there be a relationship between managerial skills and the attainment of sustainable economic development?

Table 2: Relationship between managerial skills and attainment of sustainable economic development

Variables	Mean	SD	df	r-value	p-value
Sustainable economic development	18.96	2.29			
Managerial skills	31.12	4.8	93	.317	.001

From Table 2, it was observed that there was a significant relationship between the independent variable and the dependent variable in the order of ($r = 0.317$, $P < .05$). On this premise, the researcher concluded that there was positive relationship between managerial skills and the attainment of sustainable economic development.

Discussion of Findings

The findings of the study indicated that effective planning, organizing, resources allocation, goals setting achievement, self-motivation, self-engagement and promotional skills were among managerial skills for the attainment of sustainable economic development and that there was positive relationship between managerial skills and attainment of sustainable economic development $r = 0.317$, $P < .05$). These findings were in agreement with Iheukwumere (2024) finding revealed that organization and time management; confidentiality and professionalism; strong communication skill; teamwork and collaboration; analytical thinking and innovation; and leadership and social influence are the major soft skills needed by OTM graduates for globalized employability in the 21st century office. The study concluded that graduates in office technology and management can increase their productivity, job performance, and contribution to the organization's success by utilizing their soft skills. Oluwu and Aliyu (2015) found that managerial skills have significant impact on SSBs performance. The study concluded that inadequate managerial skills are factors militating against SSBs performance and recommended that government, Non-Government Organizations and SSB owners' unions should provide adequate training and development programmes to improve the managerial skills of SSB owners and their management. These findings corroborate with Kurotimi, Franklin, Aladei & Opigo, 2017) who concluded that management skills such as organizing, self-engagement and promotional skills were among needed skills for SMEs to attained sustainability in business. Adeyemi and Owoeye (2024) found that management skills directly influence the attainment of sustainability among graduates as well as business sustainability.

Conclusion

This study has successfully examined managerial skills as factors fostering the attainment of sustainable economic development; the following conclusions were drawn based on the findings of the study that effective planning, organizing, resources allocation, goals setting achievement, self-motivation, self-engagement and promotional skills were among managerial skills for the attainment of sustainable economic development and there was positive relationship between managerial skills and attainment of sustainable economic development.

Recommendations

Based on the findings of the study, the following recommendations are provided:

1. It was recommended that Management students must embrace the programme and acquire required monument skills needed for the attainment of sustainable economic development.

2. Students of management should embrace the provided opportunities in the programme and understudy the identified areas of entrepreneurial awareness for possible venturing towards their social and economic development.
3. The study recommended that government agencies and higher education administrators make sure that all students have access to ICT facilities. Providing students with the necessary ICT skills will allow them to create simple flyers and memos, which can have an impact on communication between employers and employees, businesses and customers, and inter-business communications across physical boundaries.

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STUDENTS' PERCEPTIONS TOWARDS THE USE OF BLENDED LEARNING IN TEACHING AND LEARNING NUTRITION COURSES IN HOME ECONOMICS IN TERTIARY INSTITUTIONS IN OGUN STATE

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ABSTRACT

This paper adopts an experimental study to measure the effectiveness of a blended learning environment which is laid out based on features of physical and virtual environments. Twenty three Undergraduate Degree students enrolled in the Department of Home Economics of the Lagos State University of Education Epe Campus, Lagos State and 15 NCE students enrolled in the Department of Home Economics of the Sikiru Adetona College of Education, Science and Technology Omu-Ajose, Ogun State participated in the study. This study evaluates the efficacy of a blended learning environment that is designed with characteristics for both physical and virtual learning environments. The students attended a few departments courses, took the courses physically, virtually, and in a mixed format for the application. A blended learning environment was created using online forums, examinations, text, pictures, and course summaries accompanied by videos. Following the session, a scale on the effectiveness of the mixed learning environments was given to the students. The findings showed that there was a large gap between students' perceptions of blended learning environments as well as those of virtual and physical learning environments. Students stated in their responses that a blended learning environment helped them learn more effectively.

Keywords: ***Blended Learning, Physical Learning, Virtual Learning, Nutrition Courses***

Introduction

Today, rapid improvements at ICT (Information and Communication Technologies) as they affect every other area, they also influence and change the educational field. As a result of those changes, new approaches towards learning and teaching processes have come to the fore. Virtual, e-learning, m-learning, b-learning definitions are some of the

expressions emerged in consequence of these approaches. In various sources, b-learning can also be used as blended, mixed or hybrid (Bosch, Mentz, & Reitsma, 2019a). When accessed in terms of information transfer and interaction methods b-learning combines the positive sides of virtual and conventional face to face (physical)learning methods (Casanova, & Moreira, 2017). A face-to-face learning is one in which instructors and students meet in the same place and at the same time. In the face-to-face learning, sessions are synchronous. While no communications technologies are required for a face-to-face session (Chaeruman, 2019).). According to the Frostburg State University's virtual learning definition, virtual learning can consist of both real-time interactions, such as in Collaborate, as well as interactions, which occur over extended periods of time, such as email or an online discussion board. Your courses will be broken up into modules that contain the learning content and activities you will have to complete. Each module usually begins with text readings, PowerPoint, and lectures that provide the information you will need to complete the assignments.

The learning activities vary in each module and might include discussions, scenarios, simulations, projects, or papers. In the recent years, learning practices involving blending physical and virtual methods together are often implemented. In b-learning environment, students can access learning materials by using web technologies outside the class while attending physical education (Huda, 2018). Lessons can be supported by group discussions, chat platforms and various content presentations. In this way, the advantageous and strong aspects of physical and virtual learning compliment each other (Khodabandelou, Jalil, Ali, & Daud, 2015). While online learning environment enables time and location flexibility which is not possible within class environment, face to face education environment enables further social interaction. B-learning, which combines the advantageous aspects of these two environments, has many pluses in terms of students, lecturers, and educational institutions (Matondang, 2018).

According to the research, three main reasons the blended learning is being recommended have been put forward (Graham, 2006):

a) Boosting up effectiveness of education.

b) Increased access and convenience.

c) Greater cost effectiveness.

Most often, educators adopt blended learning approaches to explore gains and tradeoffs in comparison with strictly traditional or entirely distributed environments (Picciano, 2019). Within the studies carried out, it is stated that in comparison to conventional physical learning, students participating in b-learning applications take positive attitude towards lesson and internet supported learning and exam success rates are high (Smith, & Suzuki, 2014). Furthermore, it is also stated that interaction in virtual environment supplies individual feedback and guidance. On the other hand, when b-learning is compared to physical learning, there are also studies revealing that the difference between them is not so high in terms of success and attitude (utami, nathia. 2019). Combining both physical and virtual, b-learning has various advantages such as flexibility in respect of location and time, online sharing of learning sources, interaction of students both inside and outside the classroom. Thanks to b-learning environments educators have more time to deal with students on one-on-one basis. B-learning is not only an online or massive open course (MOOCs).

Within on-line learning, a student does not share as much time as in physical education in class with the teacher. Students can have access to the course materials anytime. However, continuous virtual learning from time to time might make students feel isolated than when students are together in a classroom discussing with an educator or other students in the same class. ItMOOCs are also e-learning platforms intended for the masses. Through this model, open learning

opportunity is provided for everyone who wishes to take lessons, without any limitation of attendance via a platform where they can not only see and hear but also participate and study together. In another words, since the "open source", namely the source in use, is open to everyone, online courses can be improved even more by the individual contributions of each participant. B-learning is the appropriate integration of the advantageous aspects of online and physical learning methods during an education process. Table 1 categorises the main distinctions between traditional academic and e-learning.

Table 1. Differences between physical and virtual learning environments

	Group	**Individual**
Focus of course	Group	Individual
Focus of content	Teacher-centered	Student-centered
Form	Synchronous	Asynchronous
Time	Scheduled	Anytime
Place	Classroom	Anywhere
Flexibility	Standardized	Customized
Content	Stable, durable	Dynamic, transitory
Number of students	Space delimited	Without limits
Instructor preparation	Some (transparencies)	Extensive pre-preparation
Distribution of materials	Hard copy	Electronic download
Interaction	Spontaneous	Structured
Range of interactivity	Full interactivity	Limited interactivity

Within an online classroom environment, students come and listen to the lesson and when they go home, they do the homework and studies related to the lesson. In contrast, during b-learning, students have already got the information concerning the lesson before they come to the class. The advantageous aspect of this model is that it enables a student to reach a lot of sources regarding the lesson in advance before coming to the classroom. The educator uses the classroom for the purpose of creating an environment of discussion with students. The internet is a means of preparing a lesson. In a b-learning environment, the educator can prepare the videos and course materials related to the lesson and upload to a server beforehand. The students can reach all the materials regarding the subject to be studied before coming to the classroom and joining the activities related to the lesson. Thereafter, when they come to the classroom, they can discuss the points that have not been understood with the educator or they can ask him to revise them again. The educator can examine what the students have learnt and have them practice it when they are in the classroom. After the lesson, the student can learn effectively by combining the information previously obtained with the one clarified in the classroom. In the b-learning model, the educator plays the role of a guide. The student is more active in comparison with physical education. The other advantageous aspects of this model for students are listed as follows:

a) The students have the control of the course videos.

b) The students can stop the lesson whenever they want and watch it again anytime.

c) The students can repeatedly watch the lesson within different timeframes.

d) The class activities and interaction with the educator enable the students to think in a more detailed manner and understand the topic better.

Though, B-learning is not a key to success in education, but it is a means of providing quality and active education. When technological developments are considered, it is clearly seen that b-learning increases the quality of education. Therefore it can be a preferable learning approach in future. The object of this study is to measure the effectiveness of a b-learning environment.

Methodology

In this study, the students who took "Nutrition courses"in the two institutions in a blended learning environment which is a combination of both physical and virtual environments, were asked to evaluate the environments separately and it was aimed to measure the effectiveness of the blended learning environment in comparison with the other environments. The study was applied to the students with 3.50 and above CGPA at 200 Level studying Home Economics, School of Vocational and Technical Education, Lagos State University of Education Oto/ Ijanikin with a Campus @ Odo- Noforija, Epe, Lagos State and Sikiru Adetona College of Education, Science and Technology, Omu-Ajose, Ogun State for 2023/2024 academic session. The duration of the study was limited to thirteen weeks. Two weeks for the examinations, four weeks for the virtual classes, four weeks the physical classes and the remaining three weeks were for the blended learning method. An open-source platform Moodle software was preferred for the student placement examination, which was required for the study. At the end of the thirteen weeks, a scale whose analysis of acceptability and reliability was done beforehand, and which was developed by Cabi and Gulbahar for measuring the effectiveness of blended learning environments was administered on the thirty five students who participatedin the study. The students filled out the scales through the internet. The scale consisted of a structure with four factors which included fifty five items in total.The factors were physical learning environments, virtual learning environments, blended learning environments respectively and technical issues. On the scale, the questions were asked under three different sections regarding physical, virtual, and blended learning environments. On the 5-point Likert type scale, the numbers stand for some adverbs of frequency. That is, 1= Always, 2= Often, 3= Sometimes, 4= rarely and 5 =Never. Since the scale results represented normal distribution, a parametric test was used. A t-test was used for dependent samplings at the stage of analysis.

Findings

As a result of analysis, scale points were added up with item points and by dividing total point to the number of items. On the 5-point Likert type scale the numbers stand for some adverbs of frequency. According to the calculated average, points were rated as Always if it was 1.0-1.8; Often if it was 1.81-2.60; Sometimes if it was 2.61-3.40; rarely if it was 3.41-4.20 and never if it was 4.21-5.0. According to the findings, the average of scale points regarding physical learning environment of the students who participated in the study have come out as (by X =2.63 means sometimes); scale points average regarding virt learning settings have come out as (by X =2.67 means sometimes) and scale points average regarding blended learning environment have come out as (by X =1.94 means often). According to these results, it can be interpreted as students' positive opinions for effectiveness of blended learning environments are higher than the other environments (Table 2).

Table 2. Descriptive statistics for the environments

Environment	Average	Standard Deviation
Physical	2.63	0.89
Virtual	2.67	0.68
Blended	1.94	0.84

For determination of whether there is a significant difference between students' opinion for physical learning environment and virtual learning environment, it was analyzed with t test for dependent samplings. According to the analysis results no significant difference could be found between students' opinion for virtual learning and physical learning environments ($p>0.05$). The 0,605 R value shows that there is a middle level positive relationship between students' opinion for online and face to face learning environments (Table 3).

Table 3. t test for the physical and virtual learning environments

	Average	Standard Deviation	t	p	R
Physical	2,43	0,89	-	0,555	0,605
Virtual	2,47	0,68	0,592		

For determination of whether there is a significant difference between students' opinion for physical and blended learning environment, it was analyzed with t test for dependent samplings. From the results, a significant difference was found between students' opinion for blended learning and physical learning environment (Table 4).

Table 4. t-test for physical learning environment and blended learning environments

	Average	Standard Deviation	t	p	R
Physical	2,43	0,89	5,773	0,000*	0,360
Blended	1,94	0,84			

For determination of whether there is a significant difference between students' opinion for online and blended learning environment, it was analyzed with t test for dependent samplings. From the results, a significant difference was found between students' opinion for blended and online learning environment (Table 5).

Table 5. t-test for virtual learning environment and blended learning environments

	Average	Standard Deviation	t	p	R
Online	2,47	0,68	8,648	0,000*	0,592
Blended	1,94	0,84			

Conclusion

The study aimed to measure the perception of students on the effectiveness of blended learning environment which is laid out based on features of physical and virtual environments. The study was applied to thirty eight students from School of Vocational and Technical Education, Lagos State University of Education, Epe Campus, Lagos State (23 Degree Students) and Sikiru Adetona College of Education, Science and Technology, Omu-Ajose, Ogun State (15 NCE Students). Nutrition courses from the Department of Home Economics in the two institutions were used. Blended learning environment has been designed in the form of online material sharing, forum, examinations, text, picture, and video supported lesson summaries. Sequel to the training, a scale had been applied to the students on the effectiveness of blended learning environment. Based on the study findings, it was observed that any type of blended learning have a positive effect on learners' study achievement than the physical learning method. In the blended learning environments, the learners cooperated actively. This, as pointed out in the previous studies on "collaborative learning in an e-learning environment", means that learners acquire existing knowledge and actively create new knowledge for given task performance in the process of sharing knowledge with the peers (VanDerLinden, 2014). It is likely that the b-learning improved students' study achievement through cognitive activities. According to the analysis results, opinions of the students who studied in blended environments vary compared to other environments and blended learning environment was more effective than physical and virtual learning environments. Furthermore, when in-class, observations and students' opinions are taken into consideration, it can be reputed that participants have positive opinions for internet supported applications and find blended learning useful. When assessing given answers there were opinions by the students that blended learning environments provided positive effects on them and pose important experience for their future life. It can be declared that in view of these statements educational practices designed within blended environments

are more beneficial to the students in terms of contentment, learning, attention, and motivation.

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INFRASTRUCTURAL FACTORS AS PREDICTORS FOR FIRM PERFORMANCE IN ALIMOSHO LOCAL GOVERNMENT, LAGOS STATE

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ABSTRACT

The study examined infrastructural factors as predictors for firm performance in Alimosho local government, Lagos State, Nigeria. Two research questions guided the study. A descriptive design of correlational typed was used. The population comprised all SMEs employees in Alimosho local government area of Ogun State. A total of 55 secretaries' working as employees in selected SMEs in Alimosho local government were selected as sample size of the study. Purposive sampling technique was used in the process of selection. Researcher developed instrument tagged: Infrastructural and Firm Performance Questionnaire (IFFPQ) with reliability coefficient 0.79 was used for data collection. Research questions 1 and 2 were analysis using mean and standard deviation as well as Pearson Product Moment Correlation (PPMC) respectively. The findings of the study revealed that road network linking the city center and rural areas, efficient railway system, constant water supply, good drainage system, effective telephone and mobile phones network, warehouse facilities and industrial parks were among the infrastructural factors needed for firm performance. It was also indicated that there was positive relationship between infrastructural factors and firm performance ($r = 0.204$, $p < .05$). It is recommended that the government provide these essential infrastructures for SMEs in a suitable manner. SMEs should also take greater initiative to attract the interest and attention of the government.

Kevwords: **Infrastructural Factors, Firm Performance, Small Scale Enterprises**

Introduction

Firm performance can be defined and measured in terms of: profitability, growth, market value, total return on shareholder, economic value added and customer satisfaction. Firm is doing everything possible to achieved its aim, that is, performance. Firm performance is measured in terms of customer satisfaction, through reduced customer complaints (Ayneshet, 2020). Firm should continuously improve their services through assets accumulation, create value, improve quality services and flexibility and it is most effective when controls are built into the organization's infrastructure. It is part of the very essence of the organization's success in terms of continued improvement on performance standards as part of the competitive advantage of the organization. Brown (2022) argued that performance measures in firm must focus

attention on what makes, identifies and communicates the drivers of success, support organizations learning and provide a basis for assessment and reward. Appropriate performance measures are those which enable the firm to direct their actions towards achieving their strategic objectives. This is because firm performance is central to the future wellbeing and prosperity of any enterprise.

Performance can be measured at both organizational and individual levels. This measurement is sometimes referred to as performance appraisal. Whyte (2021) argued that organizations have desired potentials in terms of capacity, attraction, and manual share while Remelt (2019) asserted that availability and level of resources can also be used to analyze the performance of an organization. Remelt emphasizes that resources which may include assets financing, employee skills and organizational process are key indicators of the organizations performance one time. In agreement with this, Barney (2020) suggested that resources could be grouped into physical, human and capital resources and that a firm can increase its performance only when the firm is unable to mitigate its resources. Although a strong financial performance indicated a strong institution, qualitative indicators like the nature of management and education level of the labour force must supplement the qualitative indicators in order to enable the enterprise ability to meet its focus and objectives.

Infrastructure is one of the key components of production and economic development. The definition of infrastructure can be explained as the totality of fundamental physical facilities upon which all other ranging from economic, social, and political activities. Infrastructure are those services without which primary, secondary, and tertiary production cannot work and that will lead to negative business performance. Infrastructure includes utilities such as roads, railways, port facilities, electricity, water supply and telecommunications networks. Fluctuations in the quality of infrastructure used in the production processes will significantly affect the performance of firms in terms of quantity of output, income, profits, and productivity. At macro level, it can lead to a job creation in the regional economy since a reliable infrastructure system promotes agglomeration of economic activities. Quality infrastructure is also viral for foreign direct investment and consequently boost international trade (Trand & Hong, 2021).

Even though the presence and quality of infrastructure directly affecting economic development, the availability of proper infrastructure in most developing countries is still limited. Lack of proper infrastructure in developing countries has affected the abilities of their firms to fairly compete in the global market. Unreliable infrastructure systems affect firms through various impact channels, which can be categorized by direct, indirect and induced impact. In terms of direct impact, infrastructure disruptions interrupt firms' activities, force them to operate at less than full production capacity, reduce their sales, and cause delays in the supply and delivery of goods. For instance, textile industries relying on electricity cannot produce due to power cuts, or likewise, a firm relying on water to cool a machine cannot manufacture products during a dry out. The indirect impacts of unreliable infrastructure are less immediate. They affect firms' investment decisions, sway what products can and cannot be produced, and manipulate the composition and innovativeness of an industry. For example, a firm is less likely to upgrade its machinery to more productive technology if power cuts happen frequently. In addition, due to interruption of power or logistics activities which make firms inability to provide on-demand goods and services, consequently firms become less competitive in the market. In the aggregate, these effects are visible in an economy's ability to generate wealth and in its global competitiveness. Induced impact, firms tend to incur costs for handling unreliable infrastructure. To mitigate the impacts of power cuts, firms used to own a backup power generator. However, power generators require a high operating cost which excludes more productive investments. Firms that locate in an area of inaccessibility to transport system may increase inventory capacity or worse, must move to expensive location in proximity to transport system, fast internet service (Trand & Hong, 2021).

Statement of the Problem

Small and medium scale enterprises are the pillar of economic development in most developed nations, because they generate employment opportunities, reduces poverty among other. Therefore, their performance that can leads to sustainability matter a lot and served as concern to the government of Nigeria and stakeholders in the economies. The problem facing Nigerian small business are ranked as follows: lack of finance in starting and developing business, poor infrastructures, inappropriate legislation, competition, lack of managerial skills; further problems are corruption and inflation. However, despite steps taken so far by the government, report in daily seems not favour SMEs performance, as many of them failed to celebrated their fifth year before collapsed. This study was an attempt to examine infrastructural factors as predictors for firm performance in Alimosho local government, Lagos State, Nigeria.

Objectives of the Study

The main objective of the study was to examine infrastructural factors as predictors for firm performance in Alimosho local government, Lagos State, Nigeria. Specifically, the study sought to:

1. determine infrastructural factors needed for firm performance;
2. ascertain the relationship between infrastructural factors and firm performance;

Research Questions

The following research questions guided this study:

1. What are the infrastructural factors needed for firm performance?
2. Would there be relationship between infrastructural factors and firm performance?

Methodology

The study used a descriptive design of correlational typed. A correlational research design of survey assisted the researcher to determine the predictive power of explanatory variables on dependent variable. That is, the design always appropriate to examine the relationship between explanatory and dependent variables of the study. The population of this study comprised all SMEs employees in Alimosho local government area of Ogun State. A total of 55 secretaries' working as employees in SMEs in Alimosho local government area of Ogun State were selected as sample size of the study. Purposive sampling technique was used in the process of selection. Researcher developed instrument tagged: Infrastructural and Firm Performance Questionnaire (IFFPQ). The questionnaire requested responses on a four (4) – point scale format which was a modification of 5-point Likert scale. The questionnaire was divided into 2 sections vis-a-vis sections A and B. Section A focused on demographic characteristics of the respondents while sections B examined items regarding infrastructural factors and firm performance. The questionnaire was based on Likert four scale which was modified. Face validity of the instrument was done on the instrument. A copy of the instrument was made available to the experts for corrections. Reliability of the instrument was done using the Cronbach alpha. In this case, copies of the instrument were administered on 10 SMEs secretaries in Sagamu local government area of Ogun State. The data collected were subjected to Cronbach alpha formula to get reliability coefficient of the questionnaire and reliability coefficient of 0.79 was reported. Research questions 1 and 2 were analysis using mean and standard deviation as well as Pearson Product Moment Correlation (PPMC) respectively.

Results

Research Question 1: What are the infrastructural factors needed for firm performance?

Table 1: Descriptive statistics on the infrastructural factors needed for firm performance

Items	Mean	SD
Good road network linking the city center and rural areas	2.74	.911
Railway system	2.76	.895
Electricity	2.90	.712
Good and constant water supply.	2.61	.789
Good drainage system.	2.78	.760
Telephone and mobile phones network.	2.85	.733
Warehouse facilities and Industrial parks.	2.65	.764
Cluster Mean	2.75	

Table 1 showed that cluster mean was 2.75 and the bench mark mean was 2.50. Since, 2.75 > 2.50, this implied that road network linking the city center and rural areas, efficient railway system, constant water supply, good drainage system, effective telephone and mobile phones network, warehouse facilities and industrial parks were among the infrastructural factors needed for firm performance.

Table 2: Relationship between infrastructural factors and firm performance

Variables	Mean	SD	df	r-value	p-value
Firm performance	27.51	11.62			
Infrastructural factors	24.99	6.92	53	.204	.002

From Table 2, it was indicated that there was significant relationship between the independent variable and the dependent variable in the order of ($r = 0.204$, $p < .05$). On this premise, the researcher concluded that there was positive relationship between infrastructural factors and firm performance.

Discussion of Findings

The findings of the study revealed that city center and rural areas, efficient railway system, constant water supply, good drainage system, effective telephone and mobile phones network, warehouse facilities and industrial parks were among the infrastructural factors needed for firm performance. It was also showed there was positive relationship between infrastructural factors and firm performance ($r = 0.204$, $p < .05$). These findings were in consonant with Johnson, Lawrence, Onyebuenyi and Afrogha (2024) who investigated how infrastructure in Southwestern Nigeria affects the performance of Small and Medium Scale Enterprises and they found that a substantial positive correlation between the performance of SMEs and the availability of infrastructure (road network, internet connectivity, and electrical supply), suggesting that infrastructures are essential to SMEs' ability to operate successfully. Because most infrastructures are beyond the means of SMEs. As well as Ihuoma, Felix and Awara (2023) who investigated the effect of infrastructure (electricity consumption and paved roads) on manufacturing sector performance in Nigeria and their findings showed that infrastructure, proxy by electricity supply had an adverse but not significant effect on manufacturing sector performance while paved roads had a positive and significant impact on manufacturing performance in Nigeria.

Conclusion

This study has successfully examined infrastructural factors as predictors for tfirm performance, the following conclusions were drawn based on the findings of the study that road network linking the city center and rural areas, efficient railway system, constant water supply, good drainage system, effective telephone and mobile phones network, warehouse facilities and industrial parks were among the infrastructural factors needed for firm performance. There was

positive relationship between infrastructural factors and firm performance ($r = 0.204$, $p < .05$).

Recommendations

Based on the findings of the study, the following recommendations are provided:

4. It is recommended that the government provide these essential infrastructures for SMEs in a suitable manner. SMEs should also take greater initiative to attract the interest and attention of the government.

5. The study recommended a total overhaul of the electricity sub-sector and targets increased supply specifically for industrial consumption as well as exploring alternative options to increase the road network such as public-private partnership arrangements given its importance to industrial performance.

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LEVERAGING ARTIFICIAL INTELLIGENCE, GLOBAL CONNECTIVITY AND DIGITAL LIBRARY SYSTEMS FOR SUSTAINABLE CAPACITY BUILDING FOR STUDENTS OF AUTOMOBILE TECHNOLOGY IN THE 21ST CENTURY

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ABSTRACT

This paper explores the intersection of Technological developments obtained through globalization, digital library systems and Artificial Intelligence (AI) to derive sustainable skills acquisition for students of automobile technology in the 21st century. In an increasingly interconnected world, the automobile industry faces a myriad of challenges and opportunities, from sustainability concerns to evolving consumer preferences. Leveraging Digital library Systems (DLS) alongside AI techniques presents a novel approach to address these complexities. This paper reviews existing literature on the integration of DLS and AI within the automotive sector, highlighting key applications such as data management, information retrieval, knowledge organization, and predictive analytics. Furthermore, it examines the role of AI- powered systems in enhancing vehicle safety, efficiency, and user experience. Through a synthesis of theoretical frameworks and practical examples, this paper elucidates the potential of LIS-AI synergy in driving innovation and facilitating the global diffusion of automotive technologies. Additionally, it discusses implications for research, industry practices, and policy making, emphasizing the need for interdisciplinary collaboration and ethical considerations. Overall, this paper contributes to the discourse on leveraging information science and artificial intelligence to propel the automotive industry towards a more sustainable, interconnected, and technologically advanced future.

Keywords: ***Global Connectivity, Digital Library Systems, Artificial Intelligence, Automobile Technology, Technological Developments and Capacity Building***

Introduction

The automobile industry is undergoing a significant transformation due to the advent of globalization, artificial intelligence and information science principles. The recent endeavors in designing driverless cars by Google have led to

a new dimension in vehicle design, automation, and safety. The idea of a car being able to drive itself is not new, with research into the concept dating back to the 1920s (Nitecki, 1993). The recent developments in technology that have made this concept a reality were unimaginable at that time. This concept has tremendous scope in reducing accidents caused due to driver errors and may lead to better traffic management and energy conservation. This calls for a new era of automobile design and structural concepts and the need for an efficient global information system in sharing and managing large amounts of complex AI data with lesser investment of time and resources (Deekshith, 2023).

As technology continues to advance at a rapid pace, the information science skills required to succeed in the automotive sector are constantly evolving. The rapid technological advancements witnessed over the years have greatly influenced the automobile industry in various ways. The application of these advancements in addressing the ever-increasing customer demands regarding vehicle design, quality, and performance has led to an increase in investments in research and development in this particular sector (Lemann, 2019). The use of technology has significantly improved the working conditions, making processes simpler and increasing productivity as well. Recent trends have also seen a shift in R&D investments from vehicle manufacturing to automobile design with a vision to utilize technology in creating new vehicle concepts with increased emphasis on safety and the environment (Lemann, 2019; Deekshith, 2023). It is here the automobile industry has to look way ahead and gear up for future technology. With the current rate of technology growth, much of the future design and structural concepts in vehicle manufacturing will change. It is an accepted fact that though driver safety is well addressed in current vehicle designs, there is a need to design a safe transportation system, removing the onus of driver errors in causing accidents (Salehian, 2022; Amster, 2024).Therefore it is crucial for individuals working in this industry to adapt to these changes and acquire the necessary information science skills to remain competitive in the global marketplace. The general aim of this study is to explore the intersection of library and information science and artificial intelligence in the context of sustainable skills acquisition in automobile technology to drive globalization in the 21st century.

Artificial Intelligence and Information science in Automobile Technology

The intersection between information science and automobile technology covers broad range of topics, such as the history of information science in automobile technology, global trends, manufacturing and technology, retails, marketing, statistical resources, industry news analysis, regulations and finding aids as well as organizational research (Green, Burclaff, 2020; Terrell, Herd, Marcus, Sams & Sullivan, 2023). In this scenario, LIS can play a critical role in organizing, managing, and facilitating access to the vast amount of data generated in the automobile industry. With the rapid advancements in AI, there is immense potential for leveraging AI technologies to analyze this data effectively and derive meaningful insights that can drive innovations in automobile technology.

: The Intersection between AI, information science and Automobile Technology (Authors, 2024)

The potentials of information science in Automobile Technology are as follows:

a) **Data Management and Curation:** Libraries and information science professionals are experts in organizing and curating information. In the context of automobile technology, they can help structure the massive amounts of data generated by vehicles, sensors, and connected systems. Efficient data management is crucial for training AI models effectively (Oyetola & Oyedokun, 2024).

b) **Knowledge Discovery and Insights:** AI algorithms can analyze data curated by LIS professionals to identify patterns, trends, and correlations that would be difficult for humans to detect manually. These insights can inform decisions related to vehicle design, safety, performance optimization, and more (Aldoseri, Al-Khalifa, & Hamouda, 2023).

c) **Predictive Maintenance**: AI-powered predictive maintenance can help automotive companies anticipate maintenance needs before they arise, thereby reducing downtime, improving safety, and extending the lifespan of vehicles. LIS can contribute by ensuring that historical maintenance data is appropriately stored and accessible for AI algorithms (Theissler, Pérez-Velázquez, Kettelgerdes, Elger, 2021).

d) **Autonomous Driving:** AI is at the core of autonomous driving technology. LIS can assist in managing the large datasets required for training autonomous vehicles and ensuring that the algorithms have access to accurate and up-to-date information for making split-second decisions on the road (Garikapati & Shetiya, 2024).

e) **Data Privacy and Security:** As vehicles become more connected and data-driven, ensuring data privacy and security is paramount. LIS professionals can help establish protocols for secure data handling and access control to protect sensitive information collected by vehicles (Ali-Muslam, 2024).

f) **User Experience Enhancement:** According to Aldona Krysiak-Adamczyk (2024), AI can be used to personalize the driving experience based on individual preferences and habits. By analyzing user data, AI algorithms can suggest optimal routes, adjust in-car settings, and enhance overall comfort and convenience for drivers and passengers (*See Figure 3*).

g) **Regulatory and Ethical Considerations**: Integrating AI in automobile technology raises important ethical and regulatory questions. LIS professionals can contribute by staying abreast of legal frameworks, ethical guidelines, and best practices for AI deployment in the automotive industry. By combining the expertise of LIS professionals in managing information resources with AI and Automobile Technology

Application of AI in Automobile Industry

Artificial intelligence (AI) has numerous applications in the automobile industry, transforming various aspects of design, manufacturing, sales, and customer experience. According to the studies of Iyer et al. (2020); Zaidi et al., (2020) and Chen et al., (2019). The following are some of the key AI applications in Automobile Industry (*See Table 1*)

Table 1: Application of AI in Automobile Industry

Automobile Industry	AI Applications
Design and Development	1. Computer-aided design (CAD) optimization 2. Virtual prototyping and simulation 3. Predictive analytics for performance and safety 4. Autonomous vehicle design and testing
Manufacturing	1. Predictive maintenance for equipment 2. Quality control and defect detection 3. Robotics and automation 4. Supply chain optimization
Sales and Marketing	1. Personalized customer recommendations 2. Chatbots for customer support 3. Sentiment analysis for market research 4. Dynamic pricing and inventory management
Vehicle Safety and Security	1. Advanced driver-assistance systems (ADAS) 2. Autonomous emergency braking 3. Lane departure warning systems 4. Biometric authentication
Autonomous Vehicles	1. Sensor fusion and data processing 2. Machine learning-based decision-making 3. Navigation and route optimization 4. Vehicle-to-everything (V2X) communication
Customer Experience	1. Voice assistants (e.g., Alexa, Google Assistant) 2. Infotainment systems with AI-powered recommendations 3. Driver behavior analysis and feedback 4. Personalized driving profiles
After-Sales Service	1. Predictive maintenance scheduling 2. Remote diagnostics and troubleshooting 3. AI-powered customer support 4. Warranty analysis and optimization
Supply Chain and Logistics	1. Route optimization for delivery 2. Inventory management and forecasting 3. Predictive analytics for demand planning 4. Autonomous freight transportation

Key Players in Automobile Industry are:

1. Tesla
2. Waymo (Alphabet subsidiary)
3. General Motors (GM)
4. Volkswagen Group
5. NVIDIA
6. IBM
7. Microsoft
8. Bosch

Technologies Used Include:

1 Machine learning (ML) 2. Deep learning (DL) 3. Natural language processing (NLP)4. Computer vision 5. Internet of Things (IoT) 6. Edge computing. These applications demonstrate the significant impact of AI on the automobile industry, enhancing efficiency, safety, and customer experience. As AI technology advances, we can expect even more innovative solutions to emerge (*See Figure 2*).

Figure 2: A robotics and automation, sales and marketing, customer experience with vehicle safety and insurance (Authors, 2024)

***Table 2: Leveraging* Globalization, Artificial Intelligence and Library Science for Sustainable Skills Acquisition in Automobile Technology in 21st Century**

S/N	Author(s) & Date	Title	Objectives	Problems / Gaps	Method	Findings
1	Oyetola, S. O. & Oladokun, B. D. (2024)	Role of library and information science professionals in big data research: Opportunities and Challenges	To examine the role of LIS professionals in big data research in Nigeria.	Issues like data privacy, large data volumes, and lack of specialists.	Literature design approach	Big data analysis will guarantee LIS professionals' relevance in the global workforce.
2	Salehian, S. (2022)	How advancements in vehicle safety technology can eliminate traffic fatalities	To detect LiDAR and radar positions more accurately than cameras.	Rising car accident rates; human error causes over 90% of accidents.	ADAS (Advanced Driver Assistance Systems) techniques	Adoption of safety tech needs regulators and manufacturers; many vehicles lack adequate tech.
3	Sahu, (2008)	Challenge for Libraries and Library Professionals	transformations in library practices.	competition and ICT changes work processes.		ICT growth linked to economic and democratic development.
4	Olga, A. S., Patchara, T., & Sangkon, L. (2021)	Organizational leadership in the automobile industry: KM and intellectual capital	To examine KM's role in leadership development in Korean & Thai auto firms.	TNC productivity dependency and tech capability doubts in Thai industry.	Mixed methods; statistical data & open-source collection	KM and leadership are interdependent; knowledge transfer is crucial.
5	Vijayakumar,	Potential impact	To assess how	AI race may	Historiographic	US, China, and

	A. (2023)	of AI on the emerging world order	past and current tech revolutions reshape global power.	restructure global hierarchies like past industrial revolutions.	qualitative approach	Russia's AI strategies reflect power ambitions and capabilities.
6	Garikapati, D. & Shetiya, S. S. (2024)	Autonomous Vehicles: Evolution of AI and the Industry Landscape	Investigates AI's role in autonomous vehicle decision-making.	Traditional development models insufficient for testing ADAS systems.	Operational design domain; AI model training & generation	Reveals AI algorithm use patterns and trends in the automotive sector.
7	Turban, E., Pollard, C., Wood, J. W., & Sons (2021)	Information Technology for Management	Provides a pedagogy for diverse learners to retain digital transformation content.	Challenges of IT's evolving role in the global sharing economy.	Blended learning approach	Shows how IT reshapes businesses, systems, and customer engagement.
8	Shiohira, K. (2021)	Understanding the Impact of AI on Skills Development: Education 2030	To assess AI's effect on skill development within education.	TVET's relevance depends on labour market alignment; AI's labour market impact uncertain.	AI policy review	There's a need to understand AI's effect on labour markets and TVET.

Methodology

The research method used in this study is a literature review. The literature research method is an approach to research that involves the collection, analysis, and synthesis of existing information related to a particular topic, found in books, journal articles, and other sources (Heriyanto, 2018; Rizkykawasati, 2019). This includes identifying the main themes, research questions, methods, and conclusions of these works to build a broader understanding of the area under study (Iryana, 2019). This research generally involves using electronic databases and libraries to search for relevant literature, as well as a critical selection process of the material to be included in the analysis (Dewi, 2019). The main purpose of the literature study is to find out about recent developments in the research field, identify gaps in existing knowledge, and provide justification for the proposed research (Zaluchu, 2020). The process of creating a literature study begins with determining the scope of the research, including the key words that will be used in the literature search. This is followed by screening and selecting quality and relevant literature. This process also involves assessing the methodology, validity, and relevance of each source to the topic at hand (Moha & Sudrajat, 2019). Next, information from various sources is brought together and synthesized to build a new argument or framework that will support further research or study (Sudrajat & Moha, 2019).

Analysis of Leveraging Global Connectivity, Library Science with Artificial Intelligence for Automobile Technological Advancements on EBSCO host Database

In order to analyze the evidence of the flow of search and selection technique for driving globalization, library and information science with artificial intelligence specifically focusing on the advancement in automobile technology, we presented a tree table of drivers globalization in LIS and AI – based approach on development in automobile technology after rapidly examined 8,453 articles related to globalization, LIS with artificial intelligence on the advancement in automobile technology in EBSCO host database (search was done in May 2024), with limitation to date of publication

(2015-2024). The data was collected from EBSCO host database that consists of articles of standard and acceptable quality and peer reviewed (Mukhlif, Hodonu-Wusu, Noordin and Kasirun, 2018; Zhu, Jiang, Cao, *et al.,* 2015). The first search attempt with keyword "Driving Globalization""Library and Information Science""Artificial Intelligence" AND "Automobile Technology" as the title returned 50,939 articles, 8,453 articles were screened in this study while others are excluded. citations source items indexed within EBSCO host database are reflected in this following report. 135 full-text articles were reviewed but 41 articles in all were relevant to our target, and others that are not so relevant to driving globalization, library and information science with artificial intelligence specifically focusing on the advancement in automobile technology were removed (***Figure 4***). Many of these articles are published in WoS, SCOPUS and EBSCO host databases and have passed through rigorous peer review.

Artificial Intelligence in Automobile Technology

Overview of Artificial Intelligence

Artificial Intelligence (AI) is revolutionizing the automobile industry by enabling vehicles to perceive, reason, and act autonomously. AI algorithms allow cars to make decisions, learn from data, and enhance driving. AI, with its ability helps to analyze vast amounts of data and make intelligent prediction possible (Hodonu-Wusu, 2024).

Applications of AI in Automobiles

I. **Autonomous Vehicles**

a. **Self-Driving Cars**: Today, we have seen AI powers autonomous driving systems, enabling vehicles to navigate roads, interpret traffic signs, and avoid obstacles (*See Figure 3*).

Figure 3: Self-Driving Car, Navigating Roads, Interpreting Traffic Signs, and Avoiding Obstacles

b. **Advanced Driver Assistance Systems (ADAS)**: AI enhances safety with features like lane-keeping assistance, collision warning, and adaptive cruise control.

II. **Predictive Maintenance**

AI predicts vehicle maintenance needs by analyzing sensor data and identifying potential issues before they lead to breakdowns.

III. **Natural Language Processing (NLP)**

AI-powered voice assistants like virtual co-pilots leverage NLP to interact with drivers, provide information, and control vehicle functions.

IV. **Smart Manufacturing**

AI optimizes production processes by enhancing quality control, monitoring inventory, and managing supply chains efficiently.

V. **Enhanced User Experience**

AI personalizes driving experiences by adjusting climate control, entertainment systems, and seat preferences based on driver profiles.

Benefits and Challenges of AI in Automobile Technology

According to Yada (2023), the followings are the benefits of AI in Automobile Technology:

Benefits include:

- **Safety:** AI improves road safety by detecting hazards, preventing collisions, and optimizing driving behavior.
- **Efficiency:** AI enhances fuel efficiency, reduces emissions, and streamlines traffic flow through optimized routes.
- **Convenience:** AI-enabled features like autonomous parking and adaptive cruise control offer convenience to drivers.
- **Improved User Experience:** AI provides personalized in-car experiences based on user preferences and behaviors.
- **Predictive Maintenance:** AI reduces maintenance costs by predicting component failures before they occur.
- **Cost Savings:** AI helps in saving cost when you self-drive a car. Self-driving cars can also reduce downtime and improve overall reliability and detect potential problems before it occurs.
- **Autonomous Driving:** With the help of information science and data science and python in self-driving cars, autonomous driving is impossible. Analyzing data from sensors, cameras, and other sources, self-driving cars can navigate the road and make decisions without human effort.

Challenges include:

- **Security:** Vulnerabilities in AI systems can be exploited by hackers, posing risks to the safety of autonomous vehicles.
- **Ethical Concerns:** Issues like accountability for accidents involving autonomous vehicles raise ethical dilemmas.
- **Data Privacy**: AI systems collect vast amounts of data, raising concerns about the privacy and security of this information.
- **Interoperability**: Ensuring seamless communication between AI systems from different manufacturers is crucial for future integration.
- **Regulatory Hurdles:** Developing comprehensive regulations for AI in automobiles poses challenges due to the rapidly evolving nature of the technology.
- **Cost:** AI requires a significant investment in technology and infrastructure, which can be costly for small and medium automobile firms. Additionally, maintenance and updates required to keep the systems running smoothly can also add to the overall expense of these organizations.
- **The potential for data breaches and hacking:** Automobile firms usually collect and store a large amount of data, they are vulnerable to cyber-attacks. A successful hack could compromise the privacy and personal information of the car's passengers and put them at risk.
- **The complexity of AI can also be a disadvantage:** Self-driving cars rely on complex algorithms and data processing to make decisions and navigate the road. This can make it difficult for automobile industry to diagnose and fix problems when they arise, and can also lead to errors or malfunctions in the car's operation.

- **The potential for bias in the data:** As self-driving cars collect data from a wide range of sources, there is a risk that the data may be biased in some way. This can lead to inaccuracies or errors in the car's decision-making, which can put passengers at risk.

A.I. Summary of Capacity Building of Automobile Technology Students in the 21st Century

For students of technology education, acquiring the latest automobile skills is crucial in today's rapidly evolving industry. Here are some key areas to focus on:

Emerging Technologies: Familiarisation with cutting-edge technologies like electric and hybrid vehicles, autonomous driving systems, and advanced driver-assistance systems (ADAS) [1].

Computerised Engine Management: Understanding on how to diagnose and repair complex engine management systems, including fuel injection, ignition, and emission control.

Advanced Diagnostic Techniques: Learning to use specialised diagnostic equipment and software to troubleshoot and repair modern vehicles.

Data Analytics and Interpretation: Developing skills in collecting, analyzing, and interpreting data from vehicle systems, sensors, and diagnostic tools.

Cybersecurity: Understanding the importance of cybersecurity in modern vehicles and learn how to protect against hacking and data breaches.

Sustainable Mobility: Exploring alternative fuel sources, such as hydrogen fuel cells, and learn about sustainable mobility solutions.

3D Printing and Rapid Prototyping: Familiarization with additive manufacturing techniques and their applications in the automotive industry.

Artificial Intelligence and Machine Learning: Learning how AI and ML are being applied in the automotive industry, including predictive maintenance and personalized driving experiences.

To acquire these skills, the following: are to be considered

Practical Training: Participating in hands-on training programs, internships, or apprenticeships to gain practical experience.

Online Courses and Certifications: Taking advantage of online courses, certifications, and degree programs that focus on emerging automotive technologies.

Industry Partnerships: Collaboration with automotive companies, research institutions, and industry organizations to stay updated on the latest trends and technologies.

Continuous Learning: Staying committed to lifelong learning, attending workshops, conferences, and seminars to stay current with the rapidly evolving automotive landscape...

Conclusions and Recommendations

In exploring the intersection of Library and Information Science (LIS) with Artificial Intelligence (AI) to drive globalization, for the emergence of technological developments in Automobile, it is evident that these two fields can

catalyze significant advancements in the dissemination of knowledge and information across borders to improve the capacity building of students in the 21st century. The integration of AI technologies in DLS practices can enhance the efficiency of information management, promote cultural exchange, and foster collaboration on a global scale Delfausse (2020) emphasizes the importance of ethical considerations in the adoption of AI in DLS, highlighting the need for transparency, accountability, and data privacy safeguards. As libraries embrace AI technologies to expand their reach and enhance services, it is imperative to prioritize ethical principles, ensuring that the benefits of AI are balanced with the protection of users' rights and interests. The article discussed the importance of leveraging global connectivity, artificial intelligence, and digital library systems to enhance the capacity building of automobile technology students in the 21st century. It highlighted the need for students to acquire skills and knowledge that are relevant to the rapidly evolving automotive industry. The article explores the potential of global connectivity, artificial intelligence, and digital library systems in providing students with access to cutting-edge information, expertise, and resources. In conclusion, the article emphasizes that the effective integration of global connectivity, artificial intelligence, and digital library systems is crucial for building the capacity of automobile technology students in the 21st century. By leveraging these technologies, students can acquire the skills and knowledge required to succeed in the rapidly evolving automotive industry. The article underscores the need for educators, policymakers, and industry stakeholders to work collaboratively to harness the potential of these technologies and provide students with the best possible learning experiences.

Recommendations

Based on this article's findings, the following recommendations are made:

1. Incorporate Global Connectivity: Educators should incorporate global connectivity into their teaching practices, enabling students to collaborate with peers and experts worldwide.
2. Integrate Artificial Intelligence: Artificial intelligence should be integrated into the curriculum to provide students with hands-on experience with AI-powered tools and technologies.
3. Develop Digital Library Systems: Institutions should develop digital library systems that provide students with access to cutting-edge information, research, and resources.
4. Foster Industry Partnerships: Educators and policymakers should foster partnerships with industry stakeholders to provide students with opportunities for experiential learning, internships, and job placements.
5. Provide Training and Support: Educators and policymakers should provide training and support for educators to effectively integrate global connectivity, artificial intelligence, and digital library systems into their teaching practices.
6. Monitor and Evaluate: The effectiveness of these technologies should be continuously monitored and evaluated to ensure that they are meeting their intended goals and providing students with the best possible learning experiences.

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EFFECTIVENESS OF SCRATCH, PICTOBLOX, AND PYDROID 3 IN ENHANCING PROGRAMMING PERFORMANCE AMONG JUNIOR SECONDARY SCHOOL STUDENTS IN LAGOS WEST SENATORIAL DISTRICT

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ABSTRACT

This study examines the effectiveness of Scratch, Pictoblox, and Pydroid 3 in enhancing programming performance among junior secondary school students in Lagos West Senatorial District. Using a post-test-only control group design, students were introduced to programming through a 12-week structured intervention that progressed from block-based programming (Scratch and Pictoblox) to text-based coding (Pydroid 3). Their programming performance was assessed through test scores at each phase, and data were analyzed using paired samples t-tests and ANOVA to determine differences in students' understanding, engagement, and problem-solving abilities across the tools. Findings revealed a statistically significant difference in student performance between block-based and text-based programming, with higher engagement and comprehension observed in block-based environments. Additionally, factors such as prior programming exposure, access to technology, and teacher support played a role in students' learning outcomes. The study underscores the importance of progressive learning approaches in programming education and highlights the need for a balanced integration of both block-based and text-based coding tools to ensure smooth transitions for young learners.

Keywords: **Scratch, Pictoblox, Pydroid 3, Programming Performance, Secondary School Students, Computational Thinking, Block-Based Programming, Text-Based Programming**

Introduction

The integration of technology into education has become increasingly essential, particularly in the field of programming and computer science. As global demands for technological literacy grow, there is an urgent need to introduce young learners to foundational programming skills. While programming has not yet been formally included in Nigeria's national curriculum, a growing number of schools are beginning to offer it as a subject under various labels, such as STEM (Science, Technology, Engineering, and Mathematics), STEAM (STEM + Arts), or Coding and Robotics. These variations reflect the flexibility and adaptability of programming education to meet the evolving needs of the digital age.

Despite the growing presence of programming in schools, teaching and learning programming remain a significant

challenge, especially at the junior secondary school level. Many students, particularly those in JSS 1 to JSS 3, are often exposed to programming for the first time and face difficulties in grasping complex concepts. This is largely due to the lack of a structured and standardised curriculum across schools, which leads to inconsistencies in learning outcomes (Adamu, Auwal, & Muhammad, 2021). Students struggle with understanding abstract programming concepts, logical reasoning, and algorithmic thinking. Additionally, the absence of prior exposure to problem-solving activities and computational thinking in earlier educational stages exacerbates these difficulties.

Limited access to computers and internet resources, especially in public schools, further hampers students' ability to practice and reinforce programming skills outside the classroom (Adamu, Auwal, & Muhammad, 2021). Moreover, many students find programming intimidating due to its perceived complexity, leading to low self-confidence and a lack of motivation (Ikediugwu & Anyanwu, 2019). This is often compounded by insufficient teacher support, as not all ICT teachers have specialised training in programming. The disparity in teaching quality and methodologies across schools also contributes to varying levels of student engagement and achievement.

The federal government of Nigeria has recognised the importance of ICT in education and made its inclusion a policy. The National Policy on Education (NPE, 2014) states: "In recognition of the prominent role of Information and Communication Technology (ICT) in advancing knowledge and skills necessary for effective functioning in the modern world, there is an urgent need to integrate ICT into education in Nigeria." As a result, computer science education is now recognised as one of the vocational subjects in secondary schools, with the aim of developing essential skills in learners to prepare them for the future and stimulate creativity.

At the African Summit of the World Economic Forum in Durban, South Africa, the New Partnership for African Development (NEPAD) launched the e-Schools Initiative. This initiative aimed to equip all African high schools with ICT equipment, including computers, communication devices, and other digital tools, to enhance learning outcomes (Adamu, Auwal, & Muhammad, 2021). However, the success of such initiatives depends heavily on the availability of qualified and competent teachers. Fajonyomi (2017) emphasised that the success or failure of any educational program rests largely on the adequacy and availability of dedicated teachers. Seweje and Jegede (2017) further noted that effective teaching requires not only academic knowledge but also outstanding pedagogical skills. Teacher competence, as highlighted by Ikediugwu and Anyanwu (2019), involves skills, knowledge, creativity, and attitudes necessary to cope with learning and teaching in a digital age.

Globally, there has been a sharp increase in enrollments in computing courses, but this has been accompanied by signs of decreasing student engagement. Despite considerable efforts to adapt to students' learning needs, there remains a mismatch between traditional pedagogic approaches and how students prefer to learn (Falkner & Sheard, 2019). In Nigeria, the absence of rigorous K-12 computer science or programming education means that most students encounter programming for the first time in higher education CS1 classes. In these classes, students often struggle with textual programming environments such as Visual Basic, Java, and Python. The cognitive load of learning syntax and developing programs in these environments is so high that a significant number of students fail or drop out of the course (Hermans, 2020). This highlights the need to make programming education more engaging and accessible to reduce dropout rates in Nigerian tertiary institutions (Mork et al., 2020).

To address these challenges, various tools have been developed to make programming more accessible and engaging for young learners. Scratch and Pictoblox, both block-based programming environments, provide intuitive and user-friendly

platforms that allow students to create interactive stories, games, and animations without needing to write complex code. These tools promote computational thinking and problem-solving skills, which are essential foundations for understanding programming logic (Papadakis & Kalogiannakis, 2019). Scratch, in particular, has been shown to engage novice students who may find textual programming languages less engaging. On the other hand, Pydroid 3, an integrated development environment (IDE) for Python programming on Android devices, offers an alternative for students ready to move beyond block-based programming. Pydroid 3 allows students to explore text-based coding on mobile devices, making it an attractive option for those with limited access to desktop computers. This tool provides a platform for students to build more complex projects and familiarize themselves with industry-standard programming languages.

This study aims to assess the effectiveness of Scratch, Pictoblox, and Pydroid 3 in enhancing the programming performance of junior secondary school students in Lagos West Senatorial District. The study will evaluate how these tools impact students' understanding of programming concepts, their ability to complete tasks, and their overall engagement with the subject. By comparing the outcomes of using these tools, the research will contribute to the discussion on which methods and tools are most effective in fostering programming skills among young learners in Nigeria.

Purpose of the Study

1. Assess the effectiveness of Scratch, Pictoblox, and Pydroid 3 in enhancing students' programming performance.
2. Examine how these tools influence students' understanding of programming concepts and problem-solving skills.
3. Compare student engagement and motivation when using block-based programming tools (Scratch, Pictoblox) versus a text-based tool (Pydroid 3).

Research Questions

1. What is the effectiveness of Scratch, Pictoblox, and Pydroid 3 in enhancing the programming performance of junior secondary school students in Lagos West Senatorial District?
2. How do Scratch, Pictoblox, and Pydroid 3 impact students' understanding of programming concepts and problem-solving skills?
3. What differences exist in student engagement and motivation when using block-based programming tools (Scratch, Pictoblox) compared to text-based tools (Pydroid 3)?

Literature Review

Scratch as a Tool for Engaging Novice Programmers

Resnick et al. (2009) introduced Scratch, a block-based programming environment designed to make programming accessible and engaging for young learners. The authors argue that traditional text-based programming languages often intimidate beginners due to their steep learning curve and syntax-heavy nature. Scratch addresses this challenge by allowing users to create interactive stories, games, and animations through a drag-and-drop interface, eliminating the need to write complex code. This approach not only reduces cognitive load but also fosters creativity and experimentation, making programming more enjoyable for students. The study highlights the importance of computational thinking as a foundational skill for the 21st century. Scratch promotes computational thinking by encouraging students to break down problems into smaller parts, identify patterns, and develop step-by-step solutions. Resnick et al. (2009) also emphasize the social aspect of Scratch, noting that its online community allows students to share projects, collaborate, and learn from one another. This collaborative environment enhances engagement and motivation, particularly among novice

programmers. However, the authors acknowledge that while Scratch is effective for introducing programming concepts, it may not fully prepare students for text-based programming languages. The transition from block-based to text-based coding can be challenging, as students must learn to write and debug syntax. Despite this limitation, Scratch remains a valuable tool for fostering early interest and confidence in programming, particularly in contexts where resources and teacher expertise are limited.

Evaluating the Effectiveness of Scratch in Education

Papadakis and Kalogiannakis (2019) conducted a comprehensive review of studies evaluating the effectiveness of Scratch in educational settings. Their findings indicate that Scratch significantly improves students' understanding of programming concepts, particularly in areas such as sequencing, loops, and conditional statements. The visual and interactive nature of Scratch helps students grasp abstract concepts more easily, making it an effective tool for teaching computational thinking. The study also highlights the role of Scratch in enhancing student engagement. By allowing students to create personalised projects, Scratch taps into their intrinsic motivation and creativity. Papadakis and Kalogiannakis (2019) note that students who use Scratch are more likely to view programming as a fun and rewarding activity, rather than a daunting task. This positive attitude toward programming can lead to increased persistence and better learning outcomes. Despite its benefits, the authors caution that the effectiveness of Scratch depends on how it is implemented in the classroom. Teachers play a critical role in guiding students and providing meaningful feedback. Without proper support, students may struggle to move beyond basic projects and develop deeper programming skills. Papadakis and Kalogiannakis (2019) recommend integrating Scratch into a broader curriculum that includes opportunities for reflection, collaboration, and progression to text-based programming.

The Impact of Block-Based Programming Tools on Student Engagement

Hermans (2020) explores the impact of block-based programming tools, such as Scratch and Pictoblox, on student engagement and learning outcomes. The study finds that these tools are particularly effective in reducing the cognitive load associated with learning programming. By eliminating the need to memorise syntax, block-based tools allow students to focus on understanding programming logic and solving problems. This approach is especially beneficial for beginners, who may feel overwhelmed by the complexity of text-based programming languages. The study also highlights the importance of scaffolding in programming education. Hermans (2020) argues that block-based tools provide a natural progression from simple to complex concepts, enabling students to build confidence and competence gradually. For example, students can start by creating basic animations in Scratch and later move on to more advanced projects involving variables and functions. This scaffolding process helps students develop a solid foundation in programming, which can facilitate their transition to text-based languages like Python. However, Hermans (2020) notes that block-based tools are not a panacea for all challenges in programming education. While they are effective for engaging beginners, they may not fully prepare students for the demands of professional programming. The study emphasizes the need for a balanced approach that combines block-based and text-based tools, ensuring that students develop both conceptual understanding and technical skills. Hermans (2020) also calls for further research on the long-term impact of block-based tools, particularly in diverse educational contexts like Nigeria.

Methodology

This study employed a Post-test-Only Research Design to evaluate the effectiveness of Scratch, Pictoblox, and Pydroid 3 in enhancing programming performance among junior secondary school students in Lagos State. A single group of

students participated in a 12-week programming course, where they were introduced to programming concepts using the three tools in sequential phases: Scratch (weeks 1–4), Pictoblox (weeks 5–8), and Pydroid 3 (weeks 9–12). To assess their programming performance, students took a post-test at the end of each phase. The test scores from the different phases served as the primary data for analysis. Ethical considerations such as informed consent, confidentiality, and voluntary participation were strictly adhered to throughout the study. Quantitative data were analyzed using SPSS, where a One-Way Repeated Measures ANOVA was conducted to compare students' post-test scores across the three programming tools, determining whether significant differences existed in their performance. Paired t-tests were used for pairwise comparisons between the tools to identify which programming environment yielded the highest performance gains. Descriptive statistics (mean, standard deviation) were also used to summarize students' performance trends across the phases. The intervention was structured to progressively transition students from block-based programming (Scratch and Pictoblox) to text-based coding (Pydroid 3) through hands-on activities and project-based learning. While this design provides valuable insights into the effectiveness of these tools, it acknowledges limitations such as the absence of a control group and the potential influence of external factors on student learning. Nonetheless, the study offers a practical evaluation of programming education in a real-world learning environment.

Result

Research Question 1: What is the effectiveness of Scratch, Pictoblox, and Pydroid 3 in enhancing the programming performance of junior secondary school students in Lagos West Senatorial District?

Table 1: Effectiveness of Scratch, Pictoblox, and Pydroid 3 in enhancing the programming performance

Test Source	F-Value	df	Sig. (p-value)
Programming Tool (Scratch, Pictoblox, Pydroid 3)	6.21	2, 26	0.004

Table 1 presents the effectiveness of Scratch, Pictoblox, and Pydroid 3 in enhancing the programming performance of junior secondary school students. The analysis yielded a statistically significant result, $F(2, 26) = 6.21$, $p = 0.004$, indicating that there is a significant difference in students' programming performance across the three tools. This suggests that the type of programming tool used influences students' learning outcomes, with variations in performance observed between block-based (Scratch, Pictoblox) and text-based (Pydroid 3) programming environments. Further post-hoc analysis may be necessary to determine which specific tools contributed to the observed differences.

Research Question 2: How do Scratch, Pictoblox, and Pydroid 3 impact students' understanding of programming concepts and problem-solving skills?

Table 2: Scratch, Pictoblox, and Pydroid 3 impact on students' understanding of programming concepts and problem-solving skills

Comparison	Mean Diff.	t-value	df	Sig. (p-value)
Scratch vs. Pictoblox	3.14	2.85	13	0.013**
Pictoblox vs. Pydroid 3	2.57	1.95	13	0.073
Scratch vs. Pydroid 3	5.71	3.42	13	0.004**

Table 2 examines the impact of Scratch, Pictoblox, and Pydroid 3 on students' understanding of programming concepts and problem-solving skills. The results indicate a significant difference between Scratch and Pictoblox ($t = 2.85$, $p =$

0.013) as well as between Scratch and Pydroid 3 (t = 3.42, p = 0.004), suggesting that Scratch was more effective in enhancing students' understanding compared to the other tools. However, the difference between Pictoblox and Pydroid 3 was not statistically significant (t = 1.95, p = 0.073), implying that their impact on students' learning was relatively similar. These findings suggest that block-based programming tools (Scratch and Pictoblox) may provide a more accessible and engaging introduction to programming concepts than text-based tools like Pydroid 3.

Research Question 3: What differences exist in student engagement and motivation when using block-based programming tools (Scratch, Pictoblox) compared to text-based tools (Pydroid 3)?

Table 3: Differences in student engagement and motivation in using block-based programming tools (Scratch, Pictoblox) compared to text-based tools (Pydroid 3)

Comparison	Mean Diff.	t-value	df	Sig. (p-value)
Block-Based (Scratch & Pictoblox) vs. Text-Based (Pydroid 3)	5.21	4.02	13	0.001**

Table 3 presents the differences in student engagement and motivation when using block-based programming tools (Scratch and Pictoblox) compared to the text-based tool (Pydroid 3). The results show a significant difference (t = 4.02, p = 0.001), indicating that students demonstrated higher engagement and motivation when using block-based tools than when using Pydroid 3. The notable mean difference (5.21) suggests that the visual and interactive nature of Scratch and Pictoblox may have made learning more intuitive and enjoyable for students, whereas the transition to text-based programming in Pydroid 3 might have posed a greater challenge, leading to lower engagement levels.

Discussion

The findings from this study indicate that the use of block-based programming tools, specifically Scratch and Pictoblox, significantly enhances students' programming performance and engagement compared to text-based tools like Pydroid 3. This aligns with previous research demonstrating that block-based visual programming environments (VPEs) can reduce the complexity of learning programming concepts, thereby improving student outcomes (Tsai, 2020). The visual and interactive nature of these tools appears to make programming more accessible and less intimidating for beginners, fostering a more engaging learning experience.

Moreover, the study revealed that students exhibited higher levels of motivation and interest when using block-based tools. This is consistent with prior studies suggesting that environments like Scratch not only enhance cognitive engagement but also positively influence emotional and behavioural engagement among learners (Belessova et al., 2024). The intuitive design of block-based programming allows students to focus on problem-solving and logical thinking without the added burden of syntax errors, which are common in text-based programming and can lead to frustration and decreased motivation.

However, while block-based tools are effective in introducing programming concepts, transitioning to text-based programming remains essential for advanced learning. The study observed a decline in performance and engagement when students moved to Pydroid 3, a text-based environment. This suggests a need for instructional strategies that can bridge the gap between block-based and text-based programming. Educators might consider a gradual integration approach, where students start with block-based tools to build foundational skills and confidence before transitioning to text-based programming. Such a scaffolded learning pathway could help maintain student engagement and support the development of more advanced programming competencies.

Conclusion

The findings of this study highlight the effectiveness of block-based programming tools, such as Scratch and Pictoblox, in enhancing students' programming performance, engagement, and motivation compared to text-based tools like Pydroid 3. The interactive and visual nature of block-based tools reduces the cognitive load associated with syntax errors, making programming more accessible and enjoyable for beginners. However, while block-based tools provide a strong foundation, transitioning to text-based programming remains crucial for advanced learning. Educators should adopt a scaffolded approach that gradually introduces students to text-based coding to maintain engagement and ensure the development of comprehensive programming skills. Future research should explore strategies to facilitate this transition and examine the long-term impact of these tools on students' computational thinking and problem-solving abilities.

Recommendations

1. Educators should integrate a structured progression from block-based programming (Scratch and Pictoblox) to text-based coding (Pydroid 3) to ensure students develop both engagement and proficiency in programming.
7. Schools should provide continuous teacher training and access to supportive learning resources to enhance students' transition from visual programming to text-based coding for long-term skill retention.

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PERCEIVED CHALLENGES OF OPERATIONAL PRACTICE OF COMPUTER-BASED TESTING IN NATIONAL OPEN UNIVERSITY OF NIGERIA (NOUN) IN SOUTH-WEST, NIGERIA

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ABSTRACT

The study assessed perceived challenges of operational practice of computer-based testing in National Open University of Nigeria (NOUN) in South-West, Nigeria. In an attempt to achieve the objectives of this study, two research questions were raised for the study. This study adopted phenomenological research design of qualitative research approach with the population which covered all the CBT administrators and proctors currently working in NOUN in South-West, Nigeria from which 22 participants were sampled through purposive sampling from all the study centres in three states which were selected through simple random sampling technique without replacement which was employed to select one State each from the stratified States in South-west, Nigeria (Lagos/Ogun, Oyo/Osun and Ondo/Ekiti) based on their geographical proximity and historical communalities. Interview Guide for Assessment of Challenges of Operational Practice of Computer-based Testing (IGCOP- CBT) was developed and used to elicit information through scheduled interview during working hours. All the data collected were analysed using thematic analysis. The findings of this study revealed that, some state campuses of NOUN in South-west are still using old computers for administration of CBT coupled with poor maintenance of the available resources. Further, some of the students are lacking requisite skills to take CBT exam and they don't often handle computer accessories well. there was always network issue due to geographical location of some centres. The study recommended that, management of study centres should separate CBT examination room from pen-on-paper examination room to ensure durability of the ICT resources, new computers should be provided and that, students should be given orientation on how to handle test devices during CBT to avoid damage and ensure durability of resources used for CBT operational practice.

Keywords: ***Perceived Challenges, Operational Practice and Computer-Based Testing***

Introduction

The advent of computer-based testing was a breakthrough experienced in technological advancement globally. the computer-based testing comes along to correct the errors of the oral examination and paper-based examination, as such the practices of computer-based testing is rapidly gaining much attention in assessment in educational system. This method of testing is important because it can measure different skills or sets of knowledge in order to provide new and better information about individuals' abilities. Computer-based testing (CBT) is not just an alternative method for delivering examinations; it represents an important qualitative shift away from traditional methods such as paper-based tests. Despite these advantages available in computerized test administration, it does not mean that CBTs are intrinsically better than paper-and-pencil tests. Ihe practice of CBT utilizes electronic assessment tools which had reduced the load of lecturers and teachers and facilitate exams execution purposefully because of inclusion of ICTs in education, however, for it to be much more effective, any problem encountered, before, during and after the CBT administration should be a source of concern.

Jatau and Hamidu (2023) stated that, computer-based test (CBT) is a method of conducting exams where the questions and answer options are presented electronically on a computer screen. Computer Based Test (CBT) is a test conducted using a computer as the main medium for administering and processing exam scores where the test questions and answer sheets are carried digitally by the computer. Accordingly, Fedorak. (2015) Computer-based Test is a technique used to evaluate students' knowledge using technological advancements, thereby eliminating subjective elements and improving objectivity. implementation of CBT method has been found to effectively reduce anxiety, academic stress, thus leading to significant improvements in candidates' perceptive behavioral on CBT examination.

Bennett (2015) asserted that computer-based test or examination represents a modern way of answering examination questions, replacing the written pen and paper (PNP) format. CBT is a combination of networks, hardware and software as well as means of communication, collaboration and engagement that enables the processing, management and exchange of data, information and knowledge. It can be understood to be a complex of artificial techniques and knowledge for solving instructor's problem involving marking pen and examination (Bennett, 2015). With the shift towards e-learning or computer-based testing, modern technologies are being engaged in several e-learning settings to evaluate students' progress (Sarjiyus 2018). The utilization of the Computer Based Test System (CBTS) in Nigeria has become more widely accepted in mass-driven examination, as it is a means of minimizing time consumption during marking and assessment, while also providing error-free computations and results (Jatau & Hamidu, 2023).

The practice of CBT can encourage the improvement of more legitimate evaluations. CBT has the possibilities of guaranteeing viability and effectiveness in instructing, proficient advancement, certainty and direct criticism. The practice of Computer Based Testing (CBT) have a number of important advantages compared to Paper and Pencil (PPT) Testing Ejim (2017) pointed out the area efficiency, immediate scoring and feedback in the case of multiple-choice question exams. Furthermore, CBT allows more innovative and authentic assessments due to more advanced technological capacities. Examples are the use of video clips and slide shows to assess medical students in surgery or the use of computer-based case simulations to assess social skills. However, there are also drawbacks when in the practice of CBT such as the additional need for adequate facilities, test-security, back-up procedures in case of technological failure, and time for staff and students to get acquainted with new technology.

Baker-Eveleth, Eveleth, O'Neill, and Stone (2006) observed that implementing computer exams requires a secure testing environment, one that prevents students from seeking answers by scanning their computer hard drives, instant messaging or emailing friends, or browsing the internet. To Fagbola, Adigun, and Oke, (2013) lack of standardized/unified CBT development model alone undermines the success of the e-examination platform for real-time adoption in practice. Fluck Pullen, and Harper (2009) opined that, challenges militating against the full adoption of CBT in Nigeria and other developing countries are inadequate ICT infrastructure including hardware, software and bandwidth accessibility, power supply, students / candidates inadequate skills in ICT, integrity of examination managers and software factors. Obioma, Junaidu and Ajagun (2013) observed that much of the infrastructures for automated examinations are either obsolete or overstretched in terms of capacity, accessibility, reliability and security. Again, the absence of internet facilities in our rural areas requires students travelling long distances to urban centres to have access to internet. Broadband penetration needs to be fast-tracked to reduce the cost of internet bandwidth access in Nigeria.

Usman (2021) revealed that, in Nigeria, there is high rate of poverty, schools are poorly equipped with relevant and modern textbooks let alone computers and other ICT facilities. For a successful CBT, the students are expected to be ICT complaint having laptops, printers, modern and other ICT materials with which they can interact and become conversant. Nigeria does not only lack ICT infrastructure, it also lacked the human skills and knowledge to fully integrate ICT into secondary school education (Ilesanmi and Lasisi, 2015). Ilesanmi and Lasisi (2015) noted that ICT has remained a low financial priority in most educational systems in Africa. To conserve fund that would be used to acquire computers, internet facilities and other needed infrastructure, some school proprietors may want to evade the positive change CBT has brought to our educational system. For candidates and students, poor ICT skills could be the only genuine reason for not embracing CBT in this era.

Statement of the Problem

The practices of computer-based testing were adopted in NOUN to eliminate some of the problems inherent in pencil and paper examination and to enhance the process of semester assessment of students in 100 and 200 levels. Despite the efforts of the Directorate of Examination and Assessment (DEA) in NOUN's CBT administration, there are still some inadequacies in practices which hamper effectiveness of operations which cause students to lose interest in CBT due technical issues which often lead to rescheduling of e-examination, interference of CBT administration due to unresolved issues previously experienced and some levels of unexpected frustrations experienced by both CBT administrators and students during CBT. All these unpleasant situations can be easily traced to some forms of challenges which require assessment so as to develop strategies towards CBT effectiveness. Based on this, the researcher found this study necessary.

Purpose of the Study

The purpose of this study is to assess perceived challenges of operational practice of computer-based testing in National Open University of Nigeria (NOUN) in South-West, Nigeria. Specifically, the study seeks to

1. examine the perceived problems of operational practice of computer-based testing in National Open University of Nigeria (NOUN)
2. examine the measures taken to provide solutions to the perceived problems of operational practice of computer-based testing in National Open University of Nigeria (NOUN)

Research Questions

The following research questions shall guide this study:

1. What are the perceived problems of operational practice of computer-based testing in National Open University of Nigeria (NOUN)?
2. What are the measures taken to provide solutions to the perceived problems of operational practice of computer-based testing in National Open University of Nigeria (NOUN)?

Methodology

This study adopted phenomenological research design of qualitative research approach with the population which covered all the CBT administrators and proctors who are currently working in National Open University of Nigeria in South-West, Nigeria from which 22 participants were sampled through purposive sampling from all the study centres in three states which were selected through simple random sampling technique without replacement which was employed to select one State each from the stratified States in South-west, Nigeria (Lagos/Ogun, Oyo/Osun and Ondo/Ekiti) based on their geographical proximity and historical communalities. Interview Guide for Assessment of Challenges of Operational Practice of Computer-based Testing (IGCOP- CBT) was developed and validated by some experts in educational evaluation was used to elicit information from participants through scheduled interview. The instrument was designed to be semi-structured and was used to conduct the interview during working hours. All the data collected were analysed using thematic analysis so as to answer the formulated research questions.

Results:

Research Question 1: What are the perceived problems of operational practice of computer-based testing in National Open University of Nigeria (NOUN)?

Perceived Problems of NOUN CBT Operational Practice

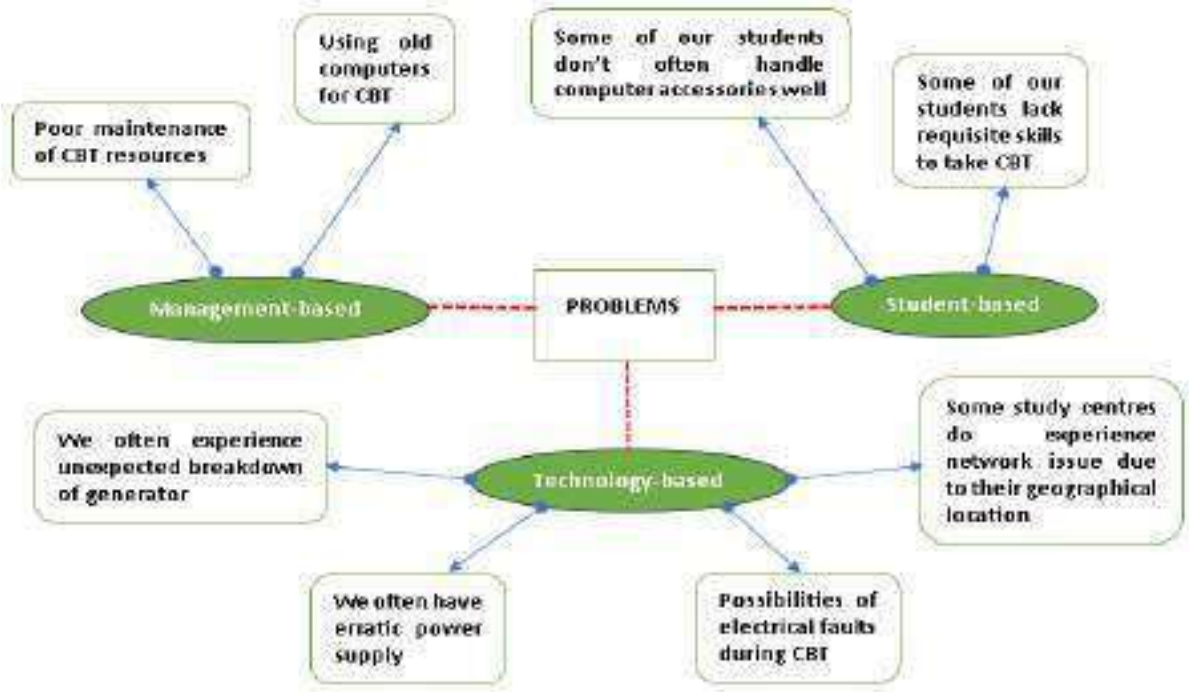

Figure 1: Problems of CBT Operational Practice in NOUN

Figure 1 presents results on the perceived problems faced by the state campuses of National Open University of Nigeria (NOUN) in South-west, Nigeria in the operational practice of computer-based testing. The results of the analysis conducted on the textual information elicited from the responses of the respondents show that, the problems faced by the state campuses are management-based, student-based and technology-based.

One of the CBT Administrators from Ondo state said that,

> *"A long time ago, we experienced network failure. Some students are not used to computer and they constantly disturb by seeking for assistance during e-exam".* (A2. CBT Administrator, Ondo).

Similarly, one of the CBT Administrator from Lagos State said that,

"Students not having ICT competences required to write CBT" (A17. CBT Administrator, Lagos).

In addition, one of the CBT Administrator from Oyo state said that,

> *"Students not handling the resources well during the e-exam. Further, there is poor maintenance on the part of the management, inadequate infrastructure to accommodate ICT resources used for CBT and here in our centre, power is an issue because we use prepaid meter and we run generator during e-exam. It is normal that, some students don't have ICT competences which hinder them to write the examination very well".* (A8. CBT Administrator, Oyo).

Another CBT Administrator from Ondo State said that,

"There is usually network issue due to this area. We usually have power failure but we do manage the situation. Students live far away from the study centre. Most of our students are living outside this community" (A5. CBT Administrator, Ondo).

Similarly, one of the CBT Administrator from Ondo State affirmed that,

"We always have network issue here. We are lucky, it has not interfered with exams for today. Sadly, it happens often. It comes and goes. It is peculiar with Isua community" (A6. CBT Administrator, Ondo).

Summarily, from the responses of the respondents and from the critical analysis conducted on the responses generated by the researcher on the perceived problems faced by the state campuses of National Open University of Nigeria (NOUN) in South-west, Nigeria in the operational practice of computer-based testing, it was found out that, management-based problems include poor maintenance of CBT resources and using old computers for administration of CBT. Student-based problems include some of the students lacking requisite skills to take CBT and they don't often handle computer accessories well. Technology-based problems include Possibilities of electrical faults during administration of CBT, erratic power supply, experiences of unexpected breakdown of generator and network issue due to geographical location.

Research Question 2: What are the suggested solutions to the perceived problems of operational practice of computer-based testing in National Open University of Nigeria (NOUN)?

Solutions to the Problems of CBT Operational Practice

Sub-Theme 2: Solutions to the Perceived Problems of CBT Operational Practice

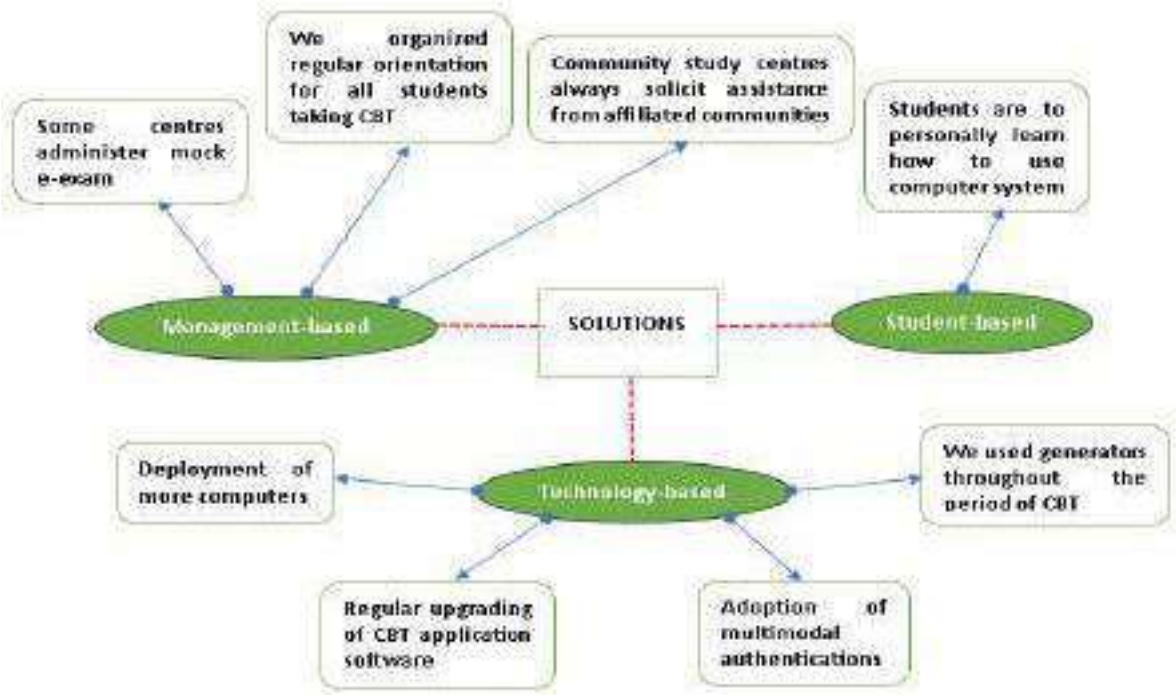

Figure 2: Solutions to the Problems of CBT Operational Practice

Figure 2 presents the results on the solutions to the perceived problems faced by the state campuses of National Open University of Nigeria (NOUN) in South-west, Nigeria in the operational practice of computer-based testing. The results of the analysis conducted on the textual information elicited from the responses of the respondents show that, solutions to the problems faced by the state campuses are also management-based, student-based and technology-based.

One of the CBT Administrators from Ondo state said that,

> *"Orientation is usually held for newly admitted students on e-exam".* (A1. CBT Administrator, Ondo).

Another CBT Administrators from Ondo state said that,

> *"Before examination, we do have brief talk with the students by informing them not to get involve in any form of examination malpractice and cheating. Further, before matriculation, we give students orientation on CBT examination".* (A2. CBT Administrator, Ondo).

In addition, one of the CBT Administrator from Lagos state said that,

> *"We provide mock examination for our students and also there should be increase on infrastructure"* (A18. CBT Administrator, Lagos).

In addition, one of the CBT Administrator from Oyo state said that,

"A place for paper-on-pen (pop) examination should be provided separately from e-examination". (A8. CBT Administrator, Oyo).

Another CBT Administrator from Ondo State said that,

"We always seek help from community elders and religious leaders by making advocacy for students at the churches and mosques etc. so as to make more awareness" (A5. CBT Administrator, Ondo).

In addition, one of the CBT Administrator from Lagos state said that,

"NGOs running computer centres for inmates will help to enhance ICT skills for inmates who are NOUN students" (A15. CBT Administrator, Lagos).

In addition, also, one of the CBT Administrator from Lagos state said that,

"Air conditioners should be provided for CBT centre and the bad ones should be repaired or replaced and that, more computers should be provided" (A16. CBT Administrator, Lagos).

One of the CBT Administrator from Oyo state said that,

"New thin client technologies should be purchased and installed". (A11. CBT Administrator, Oyo).

Another CBT Administrator from Ondo State said that,

"We always seek help from community elders and religious leaders by making advocacy for students at the churches and mosques etc. so as to make more awareness" (A5. CBT Administrator, Ondo).

Similarly, one of the CBT Administrator from Ondo State affirmed that,

"Technology have gone beyond the e-examination that noun runs currently. e-code is now used with advanced gadgets to take e-exam. Robot can be used to administer the e-examination". (A3. CBT Administrator, Ondo).

Summarily, from the responses of the respondents and from the critical analysis conducted on the responses generated by the researcher on the solutions to the problems faced by the state campuses of National Open University of Nigeria (NOUN) in South-west, Nigeria in the operational practice of computer-based testing, it was found out that, management-based solutions include organization of regular orientation for all students taking CBT, some centres administer mock e-exam to get students exposed to how the main CBT examination will be in term of experience and exposure and that, community study centres always solicit assistance from affiliated communities on provision of resources and infrastructure for enhancing their CBT centres. On student-based solution, it was found out that, students are to personally learn how to use computer system so as to minimize the complaints during the e-exam. Lastly, on technology-based solutions, it was found out that, there should be deployment of more computers, regular upgrading of CBT application software, there should be adoption of multimodal authentications that is, pictures, finger print, face logging in, the use of matriculation number etc. and the use of generators throughout the period of CBT to avoid power interruption which can destabilize and render the examination administration ineffective.

Discussion

The findings of this study on the perceived challenges confronting the state campuses of National Open University of Nigeria (NOUN) in South-west, Nigeria in the operational practice of computer-based testing revealed that, some state campuses of NOUN in South-west have poor maintenance of CBT resources, they use old computers for administration of CBT, some of the students are lacking requisite skills to take CBT and they don't often handle computer accessories well, there are possibilities of electrical faults during administration of CBT, problem erratic power supply, experiences of unexpected breakdown of generator and network issue due to geographical location. These results are in agreement with Oye, Mazleena, and Iahad, (2011) who stated that, the challenge of erratic power supply in Nigeria has defied all attempts by various governments. Irregular and frequent interrupted power supply in Nigeria is a perennial problem affecting every aspect of the economy including education. The finding of this study is also consistent with that of Obioma, Junaidu and Ajagun (2013) who observed that much of the infrastructures for automated examinations are either obsolete or overstretched in terms of capacity, accessibility, reliability and security. Again, the absence of internet facilities in our rural areas requires students travelling long distances to urban centres to have access to internet. Broadband penetration needs to be fast-tracked to reduce the cost of internet bandwidth access in Nigeria.

The finding of this study also aligns with the study of Ilesanmi and Lasisi (2015) which revealed that, many school leavers in the country are not computer literate. Even many teachers in the primary and secondary schools cannot boot a computer not to talk of using any application. With these 'analogue' teachers to impart ICT skills to students, definitely the students cannot be adequately equipped for CBT. And this anxiety explains why the resistance to JAMB's full use of CBT in 2015 UTME by students, parents and even teachers. Nigeria does not only lack ICT infrastructure; it also lacked the human skills and knowledge to fully integrate ICT into secondary school education.

The findings revealed some of the measures taken to provide solutions which include organization of regular orientation for all students taking CBT, some centres administer mock e-exam to get students exposed to how the main CBT examination will be in term of experience and exposure, community study centres always solicit assistance from affiliated communities on provision of resources and infrastructure for enhancing their CBT centres, students are to personally learn how to use computer system so as to minimize the complaints during the e-exam, there should be deployment of more computers, regular upgrading of CBT application software, there should be adoption of multimodal authentications that is, pictures, finger print, face logging in, the use of matriculation number etc. and the use of generators throughout the period of CBT to avoid power interruption which can destabilize and render the examination administration ineffective. The finding is supported by Alabi, Issa and oyekunle (2012) who asserted that, for a successful ICT-driven educational process, there must be a properly focused and consistent ICT policy orientation to support building of pervasive ICT infrastructure, focused capacity building in human resources, as well as favourable enabling legal, regulatory and policy environments.

Conclusion

Computer-Based Testing (CBT) or electronic-examination (e-exam) which is a method of tests practiced in NOUN where 100 and 200 levels are basically organized for e-examinations. Recently over the years, developments have taken place in CBT which along with it some problems were encountered by students and the administrators during test administration and these often bring disappointment, lack of interest and negative attitude towards computer-based testing. Some of these problems among others include students' inadequate skills in ICT, poor supervision on the part of the administrators,

faulty test devices, unconducive environment and negative attitude of the students towards computer-based testing. The implication of these is that, a higher use of ICT resources is always required for effective administration and to provide solutions which minimize the complaints and frustrations experienced by students and staff during the e-examination in order to ensure good operational practice of CBT in NOUN.

Recommendations

Based on the findings of this study, it is hereby recommended that:

1. Directors of study centres should encourage the heads of ICT unit to provide regular maintenance of technologies used for CBT administration.
2. Management of study centres should separate CBT examination room from pen-on-paper examination room to ensure durability of the ICT resources.
3. Mock e-examination should always be provided by the ICT unit for students preparing for CBT so as to get them exposed to the software application used for CBT, minimize complaints and failures during the main examination.
4. Students who lack basic ICT skills should be encouraged to go for personal training on computer appreciation so as to gain mastery of utilization of ICT resources before writing CBT.
5. Students should be given orientation on how to handle test devices during CBT to avoid damage and ensure durability.

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DEVELOPMENT AND INTEGRATION OF PSYCHOMOTOR - TASK ASSESSMENT SHEET FOR METALWORK TECHNOLOGY STUDENTS IN COLLEGES OF EDUCATION IN SOUTH-SOUTH, NIGERIA

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ABSTRACT

The study developed Psychomotor-Task Assessment Sheet (PTAS) for metalwork technology students in colleges of education in South-South, Nigeria. The study sought to determine appropriateness of Psychomotor - Task Assessment Sheet (PTAS), examine the level of appropriateness of the developed Psychomotor-Task Assessment Sheet (PTAS) based on Simpson's Taxonomy of Psychomotor and ascertain the reliability of the Psychomotor-Task Assessment Sheet (PTAS) for metalwork technology students in colleges of education. Three (3) research questions and hypotheses guided the study. A total population of one hundred and four (104) metalwork technology education lecturers were used. Five (5) experts validated the instrument. The instrument yielded a reliability coefficient of .87 using Cronbach Alpha. Mean and standard deviation were used to answer the research questions. Any item with mean 3.50 and above was considered appropriate whereas mean less than 3.50 was considered inappropriate and not fit for inclusion in the assessment sheet. Recommendations reached amongst others is that the ministry of education at federal and state levels should immediately commence the adoption and implementation process of Psychomotor-Task Assessment Sheet (PTAS) for assessing students' practical skill acquisition.

Kevwords: **Integration, Psychomotor, Assessment, Metalwork, Colleges of Education**

Introduction

Technical and vocational education as an integral part of total education programme contributing towards the development

of good citizens by developing their physical, social, civic, cultural and economic competencies. TVET remains one practical way to meaningfully engage the youth who are less interested in academic education in more productive economic activities. Alam (2015) TVET refers to education and training that prepares people for an employment and makes them more productive in various economic fields. According to Nwachukwu (2014) many nations both in the developing and developed world have seen TVET as a priority responsible for education as well as keen in reducing poverty and enhancing national development. To buttress the above, Ogundu and Saue (2019) posited that TVET provides an impetus geared towards the development of young people, and it is an avenue where they can earn an income and confront unemployment. Such education as TVET is offered in tertiary education among which include colleges of education in Nigeria.

The Nigerian colleges of education are one the higher degree awarding institutions of the Nigeria Certificate in Education (NCE) which offers technical, science and other conventional courses in special education, business, social sciences and humanities in order to meet the needs and interest of various individuals for sustainability in the society. According to the Federal Republic of Nigeria (FRN, 2013), the intent of establishing the Colleges of education (COEs) was to provide educational institutions where teachers shall be professionally trained, whose programmes shall be structured to equip teachers for effective performance of their duties. Colleges of education (COEs) in Nigeria are teacher education institutions that train teachers for the Nigerian schools. Buttressing the above, Suleiman, et al., (2020) noted that colleges of education were established to train primary and junior secondary school teachers; and were mandated to award the Nigerian Certificate in Education (NCE). The curriculum and programmes of colleges of education were designed to meet the nation's educational needs. College of Education as the unit of tertiary education in Nigeria saddled with the responsibility of training teachers to obtain non-degree but qualitative professional certificate in education, encompasses wide range of disciplines among which is metalwork technology.

The idea underpinning teacher education at the colleges of education as pointed out by Isiyaku (2007) as cited in Olafare, et al., (2017), included the desire of the Nigerian government to ensure uniformity of content and educational standard. It also aimed at producing teachers with highly personal and professional discipline and integrity, teachers who are dedicated, and with appropriate skills and intellectual depth that would facilitate easy achievement of the national goal. Metalwork technology is a field of study that teaches individual how to make use of metal to produce different product for daily needs. According to Anya and Kelly (2017), metalwork technology is one of the courses in colleges of education that is aimed at training skilled labor for self-reliance. Corroborating with the above, Onyije and Saue (2022) posited that metalwork technology houses a variety of essential occupational skills including machining, casting, forming, welding and fabrication, and blacksmithing (forging), which are needed in manufacturing and other related industries. Danjuma and Umaru (2019) stated that metalwork technology is the activity of making objects/products out of metals. Metalwork technology as a field of technology education is geared towards leading an individual towards the attainment of practical and applied proficiencies, alongside fundamental scientific comprehension in the realm of metalwork (Koku & Ayibakuro, 2024). Furthermore, it is specifically oriented towards cultivating the capacities of individuals to thrive with efficacy and proficiency within the societal framework, thereby fostering their active participation in its progress and betterment.

Metalwork technology involves the study where metals are redesigned and reconstructed for modern objects used at home and the industries. According to Okeme (2011), metalwork technology is the study of all aspects of metalworking such

as bench, sheet, art, metal jewelry, metal finishing, forging, casting, machines, heat treating, material testing, welding, and other fasting methods in metal manufacturing. Rocha, et al., (2023) stated that metalwork craftsmen are involved among others in the following operations: manipulating complex tools and equipment; determining and selecting appropriate metals; determination and committing to obeying safety rules guiding the complex machines they are working with. Metalwork technology education is basically obtained through technical colleges, vocational schools, colleges of education and polytechnics. These institutions provide both theoretical knowledge and practical training to students, ensuring they are well-equipped for the demands of the industry. The practical training of students in skill acquisition in various careers classified as psychomotor learning.

Psychomotor aspect of mechanical technology is meant to achieve adequate development in skills which can make the recipient employable. By implication, much attention is focused on psychomotor performance or practical learning. The psychomotor component requires the appropriate use of workshop tools, equipment, and training materials that are necessary for effective training of the craftsman in his/her chosen trade such as automobile, electrical/electronic, and metalwork technology, among others. Assessment technique supposed to determine the extent to which the students can demonstrate practical competencies using a rating scale while the teacher observes the students perform the operations involved (Asukwo, et al., 2019). Assessment of practical skills (psychomotor skills) in workshops can be carried out by evaluation of the chronological process in which the tasks are carried out (process assessment), while evaluation at the finished task or end-product refers to product assessment or a combination of both assessment techniques can be used (Okeke as cited in Moses et al., 2017). The purpose of psychomotor skills assessment is to ensure that the students can manipulate tools and equipment to attain the task specification that can serve as a valid and reliable predictor of skills acquisition in workshop practice and maintenance. An effective assessment technique is expected to assess the step-by-step as well as the manipulative ability of the students in every practical task in the workshop. In line with the above, Maxwell, (2019) emphasized that product assessment technique is the most dominant and certainly the most used form of assessment of psychomotor skills in workshops of technical colleges in Nigeria.

Statement of the Problem

The psychomotor facet of metalwork technology in colleges of education is meant to develop skills that would make recipients employable either by self or in industry. This is one of the core mandates of colleges of education as enshrined in the National policy of Education (NPE, 2013) as revised. This trade by it content, rely on the training and acquisition of requisite practical skills (Psychomotor). But, Ombugus and Ogbuanya (2014), noted that over the years, the National Technical Certificate (NTC) and the Advanced National Technical Certificate (ANTC) examination conducted by NABTEB for assessing metalwork technology students are focused more on the assessment of knowledge (cognitive), affective (attitude), and neglecting the practical skills (psychomotor). Supporting the assertion above, Okwelle and Okeke (2012) emphasized that the practical skills assessments conducted by NABTEB and lecturers/instructors are mere product rating and not skills manipulation rating of students. Buttressing the above, the researcher maintained that the scores and grades assigned to students in practical works by the lecturers as well as technologist might not be the true representative of their practical skills performance and are either underscores or over-scores the student. More so, Ming (2010) observed that there are negligible observable results in achievement of psychomotor domain in technical colleges. Sequel to this assertion, it is necessary to develop and integrate a Psychomotor-Task Assessment Sheet (PTAS) for Metalwork Technology students in colleges of education in South-South, Nigeria.

Objectives of the Study

The aim of the study was to develop a Psychomotor-Task Assessment Sheet (PTAS) for metalwork technology students in colleges of education in South-South, Nigeria. Specifically, the study to:

1. Determine the appropriateness of Psychomotor - Task Assessment Sheet (PTAS) for metalwork technology students in colleges of education.
2. Examine the level of appropriateness of the developed Psychomotor-Task Assessment Sheet (PTAS) based on Simpson's Taxonomy of Psychomotor.
3. Ascertain the reliability of the Psychomotor-Task Assessment Sheet (PTAS) for metalwork technology students in colleges of education.

Research Questions

The following three (3) were posed to guide the study.

1. How appropriate is the developed Psychomotor - Task Assessment Sheet (PTAS) for metalwork technology students in colleges of education?
2. How appropriate is the developed Psychomotor-Task Assessment Sheet (PTAS) based on Simpson's Taxonomy of Psychomotor?
3. What is the reliability coefficient of the Psychomotor-Task Assessment Sheet (PTAS) for metalwork technology students in colleges of education?

Methodology

The study was conducted in all colleges of education in South-South region of Nigeria which include; Edo, Delta, Bayelsa, Rivers, Akwa Ibom and Cross River States. The study adopted a descriptive survey research design. The design was adopted in the procedural development of the instrument based on the suggestions of Okwelle and Okoye (2012). The stages include: Identification of tasks and operations in metalwork, writing out items for the draft PTAS, Development of rating scale, preliminary face and content validation of PTAS, pilot test PTAS, administer PTAS for content validation, final PTAS assembly and try-out final PTAS. A total population of one hundred and four (104) metalwork technology education lecturers were drawn from the nine (9) colleges of education in the region. The entire 104 Metalwork Technology Lecturers in colleges of education of four (4) states in the region (Delta, Bayelsa, Rivers and Akwa Ibom States) were used for the study. The states were purposively selected on the bases of proximity. The instrument used in this study consisted of forty (43) items. The instrument contained six (6) sections lettered A-F such as; Section A: General Fitting Operations, Section B: Heat Treatment Process, Section C: Threading Operation, Section D: Turning Operations, Section E: Milling Operations and Section F: Drilling Operations. The instrument was used to gather data for research questions 1 and 2.

Table 1: Real Limit of Numbers for Five (5) Points Scale

S/N	Numerical Value	Lower Limit	Upper Limit
1.	Highly Appropriate (HA)	4.5	5.0
2.	Appropriate (H)	3.5	4.49
3.	Moderately Appropriate (MA)	2.5	3.39
4.	Inappropriate (IA)	1.5	2.29
5.	Highly Inappropriate (HI)	0.5	1.19

Validity of Instrument: The instrument was subjected to face and content validity by five (5) experts; Two (2) experts from the Department of Industrial Technical Education, Tai Solarin University of Education Ijagun, Ogun State; One (1) expert each from the Department of Metalwork Technology, Federal College of Education (Tech) Akoka; One (1) from the Department of Science and Technology Education, University of Lagos, Akoka; and One (1) expert from the Department of Measurement and Evaluation, University of Lagos, Akoka. Based on the experts' scrutiny, comments and suggestions, the final copy of the instrument was developed and used for the study.

Reliability of Instrument: The instrument yielded a reliability coefficient of .87 using Cronbach Alpha. Cronbach alpha reliability method was chosen because the instrument has lots of items of similar traits and in clusters.

Method of Data Analysis: Mean and standard deviation were used to answer the research questions. Any item with mean 3.50 and above was considered appropriate for inclusion in the assessment sheet whereas any item with a mean less than 3.50 was considered inappropriate and not fit for inclusion in the assessment sheet. The real limit of numbers was used to answer the research questions.

Results

Research Question 1: How appropriate is the developed Psychomotor - Task Assessment Sheet (PTAS) for metalwork technology in colleges of education?

Table 2: Respondents' opinions on the appropriateness of Psychomotor-Task Assessment Sheet (PTAS) for metalwork technolog

S/N	Criteria	Lecturers N = 104		
		$\bar{x}$	SD	Rmk
	Observable Skills			
	Section A: General Fitting Operations			
1.	Read machine blue print, working drawing and identify components	4.32	.56	Appr
2.	Describe the functions of the components	4.36	.95	Appr
3.	Explain the procedure for testing for efficiency of the assembled	4.44	.51	Appr
4.	Select and install saw blades in frame.	4.56	.51	Appr
5.	Cut metal to specifications using hacksaw or power saw, snip/ hand	4.92	.28	Appr
6.	File flat and curved surfaces	4.18	.39	Appr
7.	Select and use appropriate clamping device in a metal angle plate, strap	4.50	.51	Appr
8.	Protect finished surfaces when applying clamps	3.94	.85	Appr

9.	Select feed and cutting speeds to suit the diameter of drill.	4.02	.80	Appr
10.	Adjust expansion reamer to correct size of hole	4.40	.50	Appr
11.	Marking out angles using an adjustable square, combination set, protractor	4.40	.58	Appr
12.	Select correct lapping speed	4.02	.85	Appr
13.	Take accurate measurements using Vernier gauges, micrometer, optical instrument, dial indicators and vernier protractor	4.50	.86	Appr
14.	Check the alignment of centers by observing if the point of the dead center touches the point of the live center	3.92	.76	Appr
15.	Locate and align components by using dowel	4.72	.45	Appr
16.	Test for straightness, roundness, surface finish and center distance	4.84	.37	Appr
17.	Solder joints	4.74	.44	Appr
18.	Test soldered joints for rigidity and leakage	4.40	.50	Appr
19.	Select appropriate devices for assembling	3.59	1.05	Appr
20.	Test for efficiency of the assembled machine	4.10	.71	Appr
21.	Filing-off a stock using a coarse file, flat file, fine-grade file.	3.90	.68	Appr
22.	Test surface for flatness using surface plate and try square	4.42	.50	Appr
23.	Demonstrate the application of hammers and mallets for engineering purposes	4.52	.82	Appr
24.	Sharpen a twist drill correctly to manufactures' specifications	4.32	.75	Appr
25.	Rivet metals together in any given situations	4.20	.58	Appr
26.	Mark out using datum points, line, surface, solution center or dot punch etc	3.48	.98	Appr
27.	Sharpen cutting tool for plain turning, shouldering, parting off and facing operations	4.46	.50	Appr
28.	Set up rough and turned stock in 3- jaw-chuck	3.90	.74	Appr
	Section B: Heat Treatment Process			
29.	Heating to the required temperature	4.00	.70	Appr
30.	Maintaining the temperature for a certain length of time	3.78	.74	Appr
31.	Putting off the heat	4.28	.73	Appr
32.	Cooling in a way that will give the desired result	4.38	.67	Appr
	Section C: Threading Operations			
33.	Selecting the material	4.34	.80	Appr
34.	Fastening the die in a die stock	4.84	.47	Appr
35.	Grinding a chamfer on one end of the work piece	4.08	1.19	Appr
36.	Holding one hand over the centre of the work piece and applying pressure to get the first threads started.	4.34	.48	Appr
37.	Turning the die stock back frequently to break the chips	4.52	.51	Appr
38.	Backing off the die when the desired length of thread is cut	4.08	.72	Appr
	Section D: Turning Operations			
39.	Use all tools correctly ensuring machinery guide	3.40	.97	Appr
40.	Interpret working drawings	4.92	.28	Appr
41.	Select work holding devices	4.62	.49	Appr
42.	Select and grind to the correct angles lathe tool cutters/bits for different	4.62	.49	Appr
43.	Adjust slides	4.34	.82	Appr
44.	Operate the lathe to produce a piece of job to specifications	3.56	.99	Appr
45.	Carry out drilling using lathe operations	4.92	.28	Appr
46.	Carry out reaming using lathe operations	3.52	1.00	Appr
47.	Carry out knurling using lathe operations	4.06	.85	Appr
48.	Carry out tapping using lathe operations	3.42	.97	Appr
49.	Carry out parallel turning using lathe operations	4.84	.37	Appr

50.	Carry out cutting screw threads using lathe operations	4.32	.48	Appr
51.	Carry out eccentric turning operations	3.60	1.14	Appr
52.	Cut screw threads using single point tool (plung method, angular method), chasers, solid chasers, collapse chaser, thread rolling etc	4.84	.37	Appr
53.	Bore/recess while holding the job in the chuck	4.00	.81	Appr
	Section E: Milling Operations			
54.	Set up machine for various milling operations	4.42	.50	Appr
55.	Mount tools and align various cutters on the machine	4.36	.49	Appr
56.	Carry out maintenance on machine	3.69	.80	Appr
57.	Adjust the slide of the plain machine	4.06	.66	Appr
58.	Identify and select milling cam attachment	3.63	1.01	Appr
59.	Identify and select slotting attachment for a milling operation	4.20	.41	Appr
60.	Mount tools and cutters on the machines	3.75	.78	Appr
61.	Perform milling cam operations using the appropriate machine,	4.88	.33	Appr
62.	Perform differential indexing milling operations using the appropriate machine	4.44	.51	Appr
63.	Perform rotary table milling operations using the appropriate machine	4.60	.50	Appr
64.	Perform helical and spur milling operations using the appropriate machine, attachments	3.71	.82	Appr
65.	Carry out profile, dovetail and tee slot milling operations	4.40	.64	Appr
66.	Cary out dog teeth, curation, splinar milling operations	3.67	.76	Appr
67.	Mill two surface parallel at one setting	4.52	.51	Appr
68.	Select and use indexing plate - hexagonal, pentagonal	4.62	.49	Appr
69.	Mill parallel, square and angular surfaces	4.46	.65	Appr
70.	Sharpen milling cutters	3.87	.79	Appr
	Section F: Drilling Operations			
71.	Practical safety in the work place	4.28	.68	Appr
72.	Drill to specifications and observing the safety precautions in blind hole	4.72	.68	Appr
73.	Apply the correct lubricant	4.20	.71	Appr
74.	Locating and drilling center holes	3.88	.67	Appr
75.	Grind drills to the correct angles	4.80	.41	Appr
76.	Set up tools for counter boring, counter sinking and facing operations	4.64	.49	Appr
77.	Demonstrate counter boring, counter sinking and facing operations	4.40	.50	Appr
78.	Machine the seating as required for cheese head bolts or screw, counter sunk head screw	4.24	.44	Appr
79.	Demonstration slotted link operation	4.60	.50	Appr
80.	Select a reamer and appropriate speed for reaming	4.96	.20	Appr
81.	Mount a reamer on a drill chuck	4.60	.50	Appr
82.	Ream a hole observing safety precautions	4.92	.28	Appr
83.	Set the machine for drilling operation using the correct speed and feed.	3.68	1.41	Appr
84.	Drill using and radial drill machine	4.46	.73	Appr
85.	Drilling blind holes and round stock	4.24	.63	Appr
86.	Clean, oil, grease and adjust slide on slotting machine	4.48	.76	Appr
Overall Grand Mean / SD		**4.27**	**.64**	**Appr.**

Table 2 indicated the mean and standard deviation responses of respondents on the contents of the Psychomotor-Task Assessment Sheet (PTAS). Table 2 indicates that the mean responses of respondents ranges between 3.40 and 4.96. Also, from the table, it was deduced that all the items had a grand mean score of 4.27 which is above the cut-off mark of 3.5. It therefore depicts that the items are appropriate to be included in the Psychomotor-Task Assessment Sheet (PTAS) for

metalwork technology students in colleges of education in South-South, Nigeria. The standard deviation of the items range shows that the lecturers' opinion was homogeneous.

Research Question 2: How appropriate is the developed Psychomotor-Task Assessment Sheet (PTAS) based on Simpson's Taxonomy of Psychomotor?

Table 3: Mean Responses of Respondents on Developed Psychomotor-Task Assessment Sheet (PTAS) items based on Simpson's Taxonomy of Psychomotor

S/N	Levels of Taxonomy	Lecturers N = 104		
		$\bar{x}$	SD	Rmk
1.	How appropriate is the developed PTAS based on Perception.	4.28	.50	HA
2.	How appropriate is the developed PTAS based on Set	3.96	.46	HA
3.	How appropriate is the developed PTAS based on Guided Response	4.08	1.19	HA
4.	How appropriate is the developed PTAS based on Mechanism	3.96	.68	HA
5.	How appropriate is the developed PTAS based on Complex or Overt Response	4.00	.71	HA
6.	How appropriate is the developed PTAS based on **Adaptation**	4.20	.88	HA
Grand Mean / SD		**4.08**	**.73**	**A**

Table 3 portrayed the mean and standard deviation responses of respondents on the developed Psychomotor-Task Assessment Sheet (PTAS) based on Simpson's Taxonomy of Psychomotor (Perception, Set, Guided response, Complex Overt Response and Adaptation). The Table revealed that the mean responses of respondents ranges between 3.96 and 4.28, with and standard deviation between .46 and 1.19 respectively. Also, from the table, it was deduced that all the assessment criteria (Sampson' Taxonomy) had a grand mean score 4.08 which qualifies the Psychomotor-Task Assessment Sheet (PTAS) as appropriate to assess metalwork technology students' level of skill acquisition in colleges of education in South-South, Nigeria based on Simpson's Taxonomy. The standard deviation of the items range shows that the lecturers' opinion was homogeneous.

Research Question 3: What is the reliability coefficient of the Psychomotor-Task Assessment Sheet (PTAS) for metalwork technology?

Table 4: Result of reliability test of the Psychomotor-Task Assessment Sheet (PTAS) using Cronbach Alpha

S/N	Tasks	No of Items	Reliability Coefficient	Remark
1.	General Fitting Operations	28	.991	Reliable
2.	Heat Treatment Process	4	.681	Reliable
3.	Threading Operations	6	.695	Reliable
4.	Turning Operations	15	.771	Reliable
5.	Milling Operations	17	.798	Reliable
6.	Drilling Operations	16	.766	Reliable
Overall Reliability Coefficient		**86**	**.863**	**Reliable**

Table 4 revealed that each of the seven major tasks/operations has a high-reliability co-efficient. Also, the result of the analysis revealed that 86 items of the Psychomotor-Task Assessment Sheet (PTAS) were highly reliable. More so, the obtained reliability coefficient for the various clusters ranged between .681 and .991, whereas the overall reliability coefficient of the instrument was found to be .863. Hence, the developed Psychomotor-Task Assessment Sheet (PTAS) was found to be reliable and practically useful for assessing for metalwork technology trainers in colleges of education in

South-South, Nigeria.

Discussion of Findings

Table 2 revealed that the eighty-six (86) skills suggested as contents for the Psychomotor-Task Assessment Sheet (PTAS) for evaluation of metalwork technology students in practical were accepted as appropriate. It therefore depicts that the developed Psychomotor-Task Assessment Sheet (PTAS) be adopted in assessing metalwork technology students' practical works in colleges of education in South-South, Nigeria. The findings are in congruence with Adamu et al., (2015) and Mbaga et al., (2022), as all the items of the instruments they developed were considered by the respondents as appropriate for use in assessing students' performance.

Table 3 shows that the eighty-six (86) skills suggested as contents of the developed Psychomotor-Task Assessment Sheet (PTAS) were properly distributed in line with six (6) out of seven (7) Simpson's Taxonomy of Psychomotor (Perception, Set, Guided response, Complex Overt Response and Adaptation) and are appropriate to assess metalwork technology students' level of skill acquisition in colleges of education in South-South, Nigeria. This result is supported by Olaitan (2013) who admitted that psychomotor tasks are usually measured by using assessment instrument that reflects the levels of Simpson's taxonomy of Psychomotor.

Table 4 revealed that each of the seven major tasks/operations has a high-reliability co-efficient. Also, the result of the analysis revealed that 86 items of the Psychomotor-Task Assessment Sheet (PTAS) were highly reliable. More so, the obtained reliability coefficient for the various clusters ranged between .681 and .991, whereas the overall reliability coefficient of the instrument was found to be .863. Hence, the developed Psychomotor-Task Assessment Sheet (PTAS) was found to be reliable and practically useful for assessing for metalwork technology trainers in colleges of education in South-South, Nigeria. The finding is in agreement with the recommendation of Landis & Koch, (1977) cited in Adelaja and Dahuns (2023), which stated that acceptable reliability of test or instrument is generally in the range of 0.41 to 1.00. The result if further supported by Fraenkel, et al., (2023), a reliable test gives consistent results upon repeated measurement on the same individual or thing.

Conclusion

The study set out to develop and integrate Psychomotor-Task Assessment Sheet (PTAS) for metalwork technology students in colleges of education in South-South, Nigeria. The study successfully developed a valid and reliable assessment sheet for assessing students' practical skills in metalwork technology in colleges of education in South-South, Nigeria. The result related to the research question indicated that all eighty-six (86) practical skills were considered appropriate for inclusion Psychomotor-Task Assessment Sheet (PTAS). The findings of this study showed the positive responses of lecturers in South-South, Nigeria on the developed Psychomotor-Task Assessment Sheet (PTAS) in assessing students' practical skills In South-South.

Recommendations

Based on the findings of the study, the following were recommended:

1. Ministry of education at federal and state levels should immediately commence the adoption and implementation process of Psychomotor-Task Assessment Sheet (PTAS) for assessing students' practical skill acquisition.

2. The institutions, government and non-governmental organizations (NGOs) should as a matter of urgency commence the training of their staff on how to use Psychomotor-Task Assessment Sheet (PTAS) in assessing students' practical skills in South-South.
3. The National Board for Technical Education (NBTE), National Business and Technical Education Board (NABTEB) as well as other relevant examination agencies should integrate the developed Psychomotor-Task Assessment Sheet (PTAS) in their scheme as part of the assessment documents for practical skills

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AWARENESS OF ENTREPRENEURIAL SKILLS AMONG PRE-SERVICE PHYSICS TEACTERS IN NORTH-CENTRAL UNIVERSITIES, NIGERIA

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ABSTRACT

Entrepreneurial skill acquisition is becoming more important for undergraduate students as they navigate through labour/job market after graduation. Physics as a science subject is embedded with entrepreneurial skills that should reveal the unexploited potential of Physics students thereby producing a self-reliance individual who can generate wealth and add values to their society. Therefore, this study assessed the awareness level of entrepreneurial skills among pre-service Physics teachers. The study was a descriptive research of the survey type. The study comprised 693 pre-service Physics teachers from North-central universities in Nigeria. Questionnaire on awareness level was used to elicit response from pre-service teachers. Purposive sampling was used to choose institutions that offer physics education as a course, while stratified sampling was utilized to categorize the universities into Federal, State, and private categories. Three hypotheses and four research questions were developed and put to the test, respectively. The study questions were analyzed using frequency and percentage, and the hypotheses were tested using ANOVA and the t-test. Result revealed that pre-service teachers had high awareness level of entrepreneurial abilities. Also, no significant difference existed in the awareness level of entrepreneurial skills acquisition based on School ownership and gender. However, a significant difference existed based on academic years, as 400 level pre-service teachers had the highest awareness level of entrepreneurial skills. It was recommended among others that potential Pre-service teachers should be stimulated to participate in practical entrepreneurial activities to boost their level of awareness starting from lower academic years.

Keywords: **Awareness, Entrepreneurial Skills, Physics.**

Introduction

Entrepreneurship is widely acknowledged by many nations as a driving force for creativity and innovation which could foster economic growth. Entrepreneurship involves creating a new endeavor, approach to business, or creative technique to market a product or service using limited resources and risk (Agommuoh & Joseph-Kalu, 2020). This implies that entrepreneurship encompasses broad activities which include detecting opportunities and idea for wealth creation (which might lead to self-reliance) thereby adding values to the society. Entrepreneurship education is preparing the entrepreneurial mindset of students most importantly physics students to be self-employed or employer of labour. In other words, entrepreneurship education as a process, allow graduates to be transformed into individuals who have saleable skills. Entrepreneurship education therefore, promotes entrepreneurial skill awareness among undergraduate students (Nwabueze et al., 2020). For this to be accomplished, teachers as one of the instruments of realization must not be left out. Hence there is need for pre-service teachers to get acquainted with entrepreneurial skills in physics.

Physics as one of the pure science subjects, deals with the interaction between matter and energy. It explains how natural forces of nature interact which could influence the way skills are learned. Physics education therefore, aims at developing in students both cognitive and practical skills through learning of Physics concepts. Adeniyi et al. (2024) opined that Physics education which focuses on theoretical and experimental knowledge, when integrated into entrepreneurship could empower students to create business opportunities and contribute to technological advancement. Entrepreneurial skills are abilities of an individual to recognize, create and manage an enterprise successfully. Awareness of entrepreneurial skill therefore, is the consciousness of a person about generating ideas and developing an enterprise for the purpose of creating wealth. Nwoye (2012) found that Physics students lacked entrepreneurial abilities and that gender had no impact on their entrepreneurial acquisition. Likewise, awareness of entrepreneurial skills in Physics was examined by Nwoye and Okeke (2019) who surveyed pre-service physics teachers in public universities. The result revealed that low awareness level was found in public universities, but, 300 level and 400 Level pre service teachers had higher awareness level of entrepreneurial skills. Similarly, Utibe's (2017) found that physics students did not exhibit promising levels of entrepreneurial skills.

Agommuoh and Akanwa (2014) evaluated entrepreneurial skills for universal competition emphasizing that Physics teachers are more responsible and enterprising. Akinbobola and Bada (2022) opined that entrepreneurial education has been shown to improve science process abilities which will make students resourceful for self-reliance and reduce unemployment. Jolly (2024) saw physics education as a means of addressing societal issues by reskilling individuals. The study investigated how innovativeness and creativity can be integrated to physics education converting knowledge base to innovation. The study revealed that employability potential of physics education students is increasing as a result of their high enterprise awareness skills. Amalu and Adebayo (2023) examined how STEM/STEAM graduates can enhance their employability and entrepreneurship in the solar energy sector by addressing important skill gaps. It was reported that increased awareness of entrepreneurial skills on solar energy for sustainability increased graduate employability in solar energy sector.

School ownership in this study can be referred to as the authority over the school's operations which can be classified as public institution (government owned school) and private Institution (individual or group of individuals owned school). Nwoye (2012) reported that no significant difference existed in the resources available for the acquisition of entrepreneurial skill among secondary students offering Physics based on school type. The study of Nwafor et al. (2024) assessed the factors that influence undergraduate science education students' entrepreneurial inclinations at government-

owned universities. The study involved 472 undergraduate science education students from two federal universities. The study found that attitude, subjective norms, and perceived behavioral control significantly influenced undergraduate science education students' entrepreneurial inclinations.

The work of Deng and Wang (2023) revealed how entrepreneurship education affects entrepreneurial intentions among college students. Factors contain gender, household registration, school type, and poverty level. The study included 518 undergraduates from two universities. It was revealed that the impact of entrepreneurial education and intention is higher in public universities compared to private universities. Also, the study conducted by Obananya (2022) on students skill acquisition and entrepreneurial education in public university showed that Business skill acquisition of students had positive effect on skill acquisition of graduates of public colleges.

Academic year of pre-service teachers plays an important role in entrepreneurial skill acquisition because at early academic years students learn principles and fundamental methodologies and skills which serve as a groundwork for further concepts to be learned as they progress. Ergun (2019) found that pre-service science teachers STEM awareness among first-year students was much lower than other course levels. In the same vein**,** López-Fernández (2021**)** revealed that physics students, most especially at higher course levels, have a unique way to problem-solving and innovation. Moreso, Bennett and Lemoine (2020) emphasized that higher academic levels breed entrepreneurial skills acquisition among physics students.

Gender as a variable in this study is considered because it is inconclusive. Nwabueze et al. (2020) worked on creating entrepreneurship awareness among male and female undergraduate students for sustainable national development in universities. The sample size was 200 final year students. Findings from the study showed that there was a high level of awareness among undergraduate students and there was no significant difference in the level of awareness based on gender. On the other hand, Akanbi et al. (2016) reported that male students performed better than female students when investigating gender as a predictor of academic performance in Physics. Nwoye (2012) and (Nwoye & Okeke, 2019) reported that gender did not influence the level of acquisition of entrepreneurial skills among Physics students. Furthermore, Agommuoh and Akanwa (2014) showed that both male and female Physics teachers were aware of entrepreneurial skills for global competitiveness.

Based on the previous researches, this present study, assessed the awareness level of entrepreneurial skills among pre-service Physics teachers by combining variables of school ownership, academic years and gender different from what others had done.

Purpose of the Study

1. To investigate the awareness level of entrepreneurial skills by pre-service Physics teachers.
2. To examine the awareness level of entrepreneurial skills among pre-service Physics teachers based on school ownership.
3. To determine the awareness level of entrepreneurial skills among pre-service Physics teachers based on academic years.
4. To assess the awareness level of entrepreneurial skills among pre-service Physics teachers based on gender

Research Question

1. What is the awareness level of entrepreneurial skills by pre-service Physics teachers?

Research Hypotheses

1. There is no significant difference in the awareness level of entrepreneurial skills among pre-service Physics teachers based on school ownership.
2. There is no significant difference in the awareness level of entrepreneurial skills among pre-service Physics teachers based on academic years.
3. There is no significant difference in the awareness level of entrepreneurial skills among pre-service Physics teachers based on gender.

Methodology

This study employs descriptive research of the survey type. The study included 693 pre-service Physics teachers from eight universities in North-Central geopolitical zone in Nigeria, It involved 446 male and 247 female participants. The study employed stratified random sampling to categorize universities as Federal, State, or Private, and purposive sampling to select universities that run Physics education as a course. Pre-service Physics teachers were selected purposively based on their relevance to the study. This study used a questionnaire designed by the researcher. Researchers utilized descriptive statistics of frequency and percentage to answer questions. The first and second hypotheses were tested using analysis of variance (ANOVA), whereas t-test was used to test the third hypothesis.

Results

Demographic Data of the Respondents

Table 1 shows that out of 693 (100%) pre-service physics teachers sampled for this study, 429 (61.9%) of them were from federal universities; 227 (32.7%) were from the state universities while 37 (5.3%) of the participants were from the private universities. Also, 108 (15.6%) of the participants were in 200 level; 214 (30.8%) were in 300 level while 371 (53.5%) of the participants were in 400 level. In addition, 446 (64.4%) of the pre-service physics teachers were males while 247 (35.6%) were females.

Table 1: ***Demographic Data of the Respondents***

School Ownership	**Frequency**	**Percentage**
Federal	429	61.9
State	227	32.8
Private	37	5.3
Total	693	100.0
Academic Levels	**Frequency**	**Percentage**
200	108	15.6
300	214	30.8
400	371	53.5
Total	693	100.0
Gender	**Frequency**	**Percentage**
Male	446	64.4
Female	247	35.6
Total	693	100.0

Research Question 1: What is the level of awareness of entrepreneurial skills of pre-service physics teachers?

Table 2 illustrations the results of level of awareness of entrepreneurial skills of pre-service physics teachers. Most pre-service physics teachers were aware of entrepreneurial skills embedded in physics as majority of the items had mean above

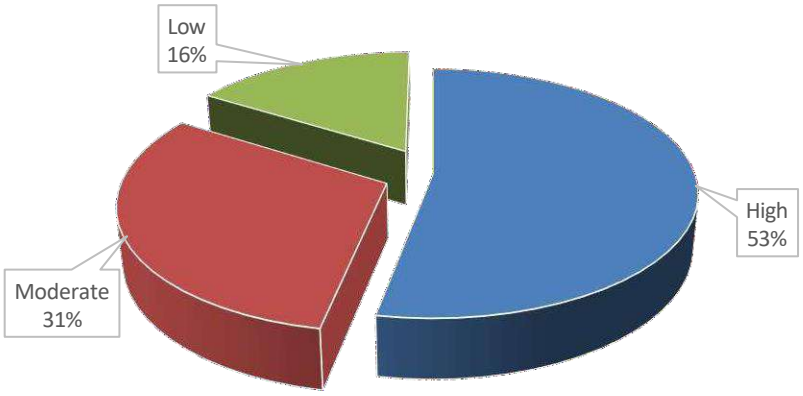
2.5 benchmark. These are: I am aware that physics provide requisite skills that can make me self-reliant (3.22), Entrepreneurial skills in Physics will equip me with ideas for self-employment (3.21), I am aware of entrepreneurial skills that can help to solving economic problem (2.91), I am aware that Physics rouses innovative and creativity skills in me (3.18), Physics enhances entrepreneurial opportunities that can convert to wealth creation (3.09), Entrepreneurial skills acquired in Physics will help me in opportunity recognition (2.95) and I am aware that entrepreneurial skills in Physics may determine my choice of career or Job after schooling (2.89). This implies that most of the pre-service teachers are fully aware of entrepreneur skills in physics, hence, pre-service teachers had high level of awareness.

Table 2:

Awareness Level of Entrepreneurial Skills among University Pre-service Teachers in North Central, Nigeria

Awareness Levels	Score Range	Frequency	Percentage
High	25 – 32	367	53.0
Moderate	17 – 24	214	30.8
Low	8 – 16	112	16.2
Total		693	100.0

Figure 1: Awareness level of entrepreneurial skills in Physics



H0$_1$: There is no significant difference in the awareness level of entrepreneurial skills among pre-service Physic teachers based on school ownership

Table 3 illustrations that the F-value 1.848 was obtained with a p-value 0.158 when computed at 0.05 alpha level. Since the p-value of 0.158 obtained was greater than 0.05 level of significance, the null hypothesis one was not rejected. This implies that there was no statistically significant difference in the awareness level of entrepreneurial skills among pre-service Physics teachers based on school ownership ($F_{\{2, 690\}} = 1.848$, $p>0.05$).

Table 3: ***ANOVA Summary Statistics of the Difference in the Awareness Level of Entrepreneurial Skills among Pre-service Physics Teachers based on School Ownership***

	Sum of Squares	*f*	Mean Square	F	Sig.
Between Groups	28.165	8	14.083	1.84	.158
Within Groups	5259.145	90	7.622		

Total	5287.310	92			

**Insignificance at p>0.05*

H0₂: There is no significant difference in the awareness level of entrepreneurial skills among pre-service Physics teachers based on academic years.

Table 3 illustrations that the F-value 4.218 was obtained with a p-value 0.025 when computed at 0.05 alpha level. Since the p-value of 0.025 obtained was less than 0.05 level of significance, the null hypothesis two was not accepted. This means that there was a statistically significant difference in the awareness level of entrepreneurial skills among pre-service Physics teachers based on academic y ears ($F_{\{2, 690\}} = 4.218$, $p<0.05$).

Table 4: ANOVA Summary Statistics of the Difference in the Awareness Level of Entrepreneurial Skills among Pre service Physics Teachers based on Academic Years

	Sum of Squares	*df*	Mean Square	F	Sig.
Between Groups	63.862	2	31.931	4.218	.025
Within Groups	5223.449	690	7.570		
Total	5287.310	692			

**Significance at p<0.05*

Sequel to the establishment of a significant difference between the means on the basis of academic years, further test was carried out on the various combinations of means to find out where the difference occurred. The test was conducted using Duncan's Post Hoc procedure at 0.05 alpha level. The Post Hoc is a statistical procedure used to determine which of the multiple groups actually made the difference.

Table 5 illustrates that the difference noted in Table 4 was contributed by 400 level pre-service physics teachers having the higher mean of 38.26 than 300 level and 200 level pre-service physics teachers. Hence, 400 level pre-service physics teachers were more aware of physics–related entrepreneurial skills than those in 300 level and 200 level.

Table 5

Duncan's Post Hoc showing the Difference in the Awareness of Physics–related Entrepreneurial Skills among University Pre-service Teachers based on Academic Years

Academic Level	N	Subset for alpha = 0.05	
		1	2
200level	108	33.6921	
300level	214	34.1005	
400level	371		38.2582
Sig.		.415	1.000

Means for groups in homogeneous subsets are displayed

a. Uses Harmonic Mean Sample Size = 296.043

b. The group sizes are unequal. The harmonic mean of the group sizes is used.

Type I error levels are not guaranteed

H0₃: There is no significant difference in the awareness of entrepreneurial skills among pre-service Physics teachers based on gender.

Table 6 illustrations that the t-value 0.751 is obtained with a p-value of 0.117 when computed at 0.05 alpha level. Since the p-value of 0.117 is greater than 0.05 level of significance, the null hypothesis three is not rejected. Hence, there was

no statistically significant difference in the awareness level of entrepreneurial skills among pre-service Physics teachers based on gender ($t_{\{691\}} = 0.251$, $p>0.05$).

Table 6: ***t-test Statistics showing the Difference in the Awareness Level of Entrepreneurial Skills among Pre-service Physics Teachers based on Gender***

Gender	No	Mean	S.D.	*df*	*t-value*	Sig	Remark
Male	446	37.32	3.65	691	0.251	0.454	Not Rejected
Female	247	38.19	3.901				

**Insignificance at p>0.05*

Discussion

This study evaluated the awareness of entrepreneurial abilities among pre-service Physics teachers. The study found that pre-service teachers in North central universities in Nigeria have a high understanding of entrepreneurial skills connected to physics. The findings align with Jolly (2024) who showed that employability potential of physics education students increased as a result of their high enterprise awareness skills however, the result is not in agreement with Nwoye (2012), Utibe (2017) and; Nwoye and Okeke, (2019) revealed that the level of acquisition of entrepreneurial skills among Physics students was low because of unawareness of the entrepreneurial skills embedded in Physics Curriculum. The high awareness level of entrepreneurial skills could be traced to increased emphasis on entrepreneurship education and an educational shift towards creativity, innovation and self -reliance. This makes students to view entrepreneurship as a worthwhile alternative.

The finding is in contrast with the work of Nwoye (2012) who assessed resources and entrepreneurial skill acquisition and found a low awareness in entrepreneurial skills among Physics students in public school. This result implies that both public (Federal and State) and private universities possess the similar level of exposure to entrepreneurial skills acquisition. That is, pre-service teachers in these universities were aware of entrepreneurial skills in Physics. This would have been achieved through collaboration with schools and uniformity in allocation of resources. The high awareness among pre-service teachers in these institutions means that pre-service teachers will likely engage in entrepreneurial activities in future.

However, a statistical variation occurred in the awareness level of entrepreneurial skills in Physics among university pre-service teachers on the basis of academic years with higher academic year pre-service teachers showing higher awareness of entrepreneurial skills. The findings in line with López-Fernández et al. (2021) who revealed that physics students, most especially at higher course levels, have a unique way to problem-solving and innovation. Also, Bennett and Lemoine (2020) showed that higher academic levels breed entrepreneurial skills acquisition among physics students. The reason for high awareness among higher academic years could be that 400 level students have been exposed to entrepreneurship courses and opportunities, involvement with their project works at the verge of graduation and experience would likely heighten their awareness of the importance of entrepreneurial skills. This implies that entrepreneurship is being introduced lately or the teaching approach does not give room for practical orientation.

This result indicates that entrepreneurial skills in hardly emphasised at lower academic years which may decrease the

potential innovation and creativity among pre-service Physics teachers. Hence, there is need for progressive integration

and assessment of entrepreneurship. Curriculum reform should introduce entrepreneurship earlier in various courses in order to boost their interest and competence. Therefore, students should be exposed to equal opportunities irrespective of their course level. Moreso,, on the basis of gender, no significant difference exists in the awareness level of entrepreneurial skills between male and female pre-service Physics teachers. The finding is in agreement with Nwoye (2012) and (Nwoye & Okeke, 2019) reported a low acquisition of entrepreneurial skills by male and female physics students, Also, Agommuoh and Akanwa (2014) showed that both male and female Physics teachers were aware of entrepreneurial skills for global competitiveness. However, the study is contrary to the work of Akanbi (2016) who reported that male Physics students performed better than female physics students. This result could be traced to the societal shift in encouraging female participation in business and innovation. This implies that no gender bias and hence male and female pre-service teachers were aware of the entrepreneurial skills in Physics. It also suggests that both male and female pre-service physics teachers were opened to equal opportunities and abilities in entrepreneurial skills acquisition. Therefore, when both male and female pre-service teachers are aware of entrepreneurial skills, high productivity and innovation would be achieved.

Conclusion

Physics has capacity to unravel the available potential that would make pre-service teachers become self-reliant and create wealth. However, students should be taught to recognize entrepreneurial skills that could lead to self-reliance starting from lower academic years. Moreso, establishment of innovation and entrepreneurship centres by Tertiary Education Trust Fund (TETFUND) could strengthen the link between research and industry sector.

Recommendations

1. Pre-service teachers should be encouraged to engage in practical entrepreneurial activities.
2. School owners should hire resourceful teachers who will foster creativity and innovation in Physics.
3. Lecturers should teach in such a way that students can identify chances for individual skill development.
4. Encourage equal representation of pre-service teachers in entrepreneurial activities.

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INFLUENCE OF TEACHER VARIABLES ON PERCEPTIONS AND ATTITUDES TOWARD GREEN CHEMISTRY IN KWARA STATE

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ABSTRACT

This study examines influence of teacher variables on perceptions and attitudes toward Green Chemistry in Kwara State. Proportionate sampling technique across the three senatorial districts of Kwara State. Data were collected using validated and reliable questionnaires and analysed using independent samples t-tests at a 0.05 significance level. Results revealed no significant differences in perceptions and attitudes based on teaching experience or academic qualifications. These findings suggest. Findings suggest that teachers share similar views on green chemistry concepts regardless of experience or qualifications. The lack of exposure to innovative approaches, insufficient professional development, and limited curriculum support may explain these uniform perceptions and attitudes. The study recommends that the Ministry of Education and relevant stakeholders should revise the secondary school chemistry curriculum to include green chemistry concepts. These revisions should emphasise practical applications and their relevance to sustainability. Furthermore, Education policymakers should develop clear guidelines and incentives to encourage schools and teachers to adopt green chemistry practices effectively.

Keywords: **Teachers Variables, Perceptions, Attitude, Green Chemistry Concepts, Secondary School Curriculum**

Introduction

Science has evolved alongside technological advancements, leading to the integration of scientific products into various aspects of daily life, from household appliances and office equipment to industrial applications and educational tools (Fajar, 2019). In Nigerian secondary schools, science subjects encompass fundamental disciplines such as physics, biology, and chemistry. Chemistry, as a scientific discipline, consists of two essential components: chemistry as a product and chemistry as a process. Chemistry as a product includes a comprehensive body of knowledge, encompassing factual information, fundamental principles, and theoretical frameworks. Conversely, chemistry as a process involves the skills and attitudes required to acquire, apply, and expand chemical knowledge (Ozgelen, 2012). One of the critical areas of chemistry is the use of solvents in chemical activities. Most industrial solvents are traditional volatile compounds that pose significant environmental and health risks due to their hazardous and toxic properties. These solvents, derived from

the petrochemical industry, are not only expensive but also contribute substantially to industrial waste, exacerbating environmental pollution. The adoption of greener solvents presents an opportunity to reduce chemical hazards and promote sustainability in industrial and educational settings (Banger et al., 2023).

Sustainable development is a crucial concept that seeks to balance human development with the preservation of natural systems, ensuring that present needs are met without compromising future generations' ability to meet theirs (Johnson et al., 2023). The ultimate goal of sustainable development is to foster a society where human well-being aligns with environmental sustainability (Mensah, 2019). Achieving this goal requires a holistic approach that integrates economic, social, and environmental considerations. Sustainable development has gained attention across various sectors, including education (Hamidah et al., 2017)." Beyond renewable energy and sustainable agriculture, sustainable development encompasses initiatives like zero waste and green chemistry. Green chemistry should not be seen as a separate subfield but rather as a guiding philosophy that integrates sustainability into all aspects of chemistry (Santos & Guidote, 2015). In education, green chemistry aims to develop chemical products and processes that minimise harmful environmental and health effects (Chen et al., 2020). Effective integration of green chemistry concepts into the senior school chemistry curriculum requires a well-structured teaching and learning approach, with chemistry teachers playing a crucial role in imparting practical knowledge. The curriculum serves as a standardised framework for student learning and skill development, ensuring equitable access to quality education worldwide (Ride, 2022). In Nigeria, the chemistry curriculum is designed to equip students with essential scientific knowledge and skills, enabling them to contribute meaningfully to society (Federal Republic of Nigeria, 2013).

The secondary school chemistry curriculum is instrumental in shaping students' academic and professional aspirations, as noted by Igboanugo (2018). Secondary education serves as a bridge between primary education and higher education, laying the foundation for students' future careers (Polycarp et al., 2023). Moreover, it plays a crucial role in enhancing national capacity, particularly in the advancement of scientific and technological knowledge (Shamim et al., 2023). However, the success of any curriculum reform depends significantly on teachers' perceptions and attitudes. Teachers' perceptions—shaped by prior knowledge, experiences, and professional development—greatly influence their instructional practices and willingness to implement new concepts (Stamatio & Michail, 2020). Studies have shown that teachers with positive attitudes and supportive behavioural intentions are more likely to engage with and effectively implement curriculum changes (Lee, 2000; Waugh, 2000; Rashid & Pyng, 2019).

Studies by Oyelekan and Salihu (2022) found that teachers' experience positively influences their knowledge and ability to deliver green chemistry concepts. However, despite increasing global emphasis on green chemistry, the adoption of alternative safer solvents; a key aspect of green chemistry remains largely unexplored in Nigerian secondary schools. This gap in implementation hinders efforts to replace hazardous chemical products with safer alternatives, which could contribute to a hazard-free learning and working environment. In light of this, the present study examines the Influence of Teacher Variables on Perceptions and Attitudes toward Green Chemistry in Kwara State

Purpose of the Study

The main purpose of the study is to examine teachers variables influence on perceptions and attitude towards green chemistry concepts in secondary school curriculum in Kwara state, Nigeria. Specifically, the study investigated

1. perception of chemistry teachers on green chemistry concepts in secondary school curriculum based on teaching experience.

2. perception of chemistry teachers on green chemistry concepts in secondary school curriculum based on academic qualification.
3. attitude of chemistry teachers towards green chemistry concepts in secondary school curriculum based on teaching experience and;
4. attitude of chemistry teachers towards green chemistry concepts in secondary school curriculum based on academic qualification.

Research Hypotheses

The following null hypotheses were tested at 0.05 level of significance.

H_{01}: There is no significant difference in the perceptions of experienced and less experienced chemistry teachers towards green chemistry concepts in secondary school chemistry curriculum.

H_{02}: There is no significant difference in the perceptions of qualified and unqualified chemistry teachers towards green chemistry concepts in secondary school chemistry curriculum.

H_{03}: There is no significant difference in the attitude of experienced and less experienced chemistry teacher towards green chemistry concepts in secondary school chemistry curriculum.

H_{04}: There is no significant difference in the attitude of qualified and unqualified chemistry teachers towards green chemistry concepts in secondary school chemistry curriculum.

Related Works

Chemistry teachers play a crucial role in integrating green chemistry concepts into the curriculum. Understanding their perceptions and attitudes is essential for effective implementation. Several studies have examined how factors such as teaching experience, academic qualifications, and professional background influence teachers' perceptions and attitudes toward chemistry education, providing a foundation for understanding their impact on green chemistry education.

Influence of Teaching Experience on Teachers' Perceptions and Attitudes

Several studies have explored the impact of teaching experience on teachers' perceptions of chemistry-related challenges. Alake (2024) investigated in-service teachers' perceptions of the difficulty of chemistry content in the senior secondary school curriculum. The study, involving 120 secondary school teachers, found no significant difference in perception between experienced and less experienced teachers regarding content difficulty. This suggests that teaching experience alone does not necessarily shape teachers' perceptions of subject complexity. Similarly, Chikere, Remi, and Grace (2023) examined teachers' perceptions of the challenges associated with school-based assessments in secondary schools. Using a survey design and a stratified proportionate random sample of 128 teachers, the study found no significant difference in perception based on teaching experience. This further supports the idea that experience may not be the sole factor influencing teachers' views on pedagogical challenges.

In contrast, Vidushy (2023) found a significant difference in teachers' attitudes toward teaching based on their teaching background. The study, which surveyed 700 secondary school teachers across seven districts in Punjab, utilised a one-way ANOVA and revealed variations in teachers' attitudes due to differences in teaching competency, location, and experience. These findings suggest that while experience alone may not always determine perceptions of curriculum challenges, it could influence attitudes toward teaching.

Academic Qualifications and Teachers' Perceptions

Another key factor examined in the literature is the role of academic qualifications in shaping teachers' perceptions. Al-Mashkoor et al. (2021) investigated chemistry teachers' awareness of chemical innovations in middle and high schools in Al-Qadisiyah. Using a 54-item awareness scale, the study found no significant difference in awareness levels based on years of service. This indicates that tenure or higher academic qualifications do not necessarily enhance awareness of new chemical innovations, emphasizing the need for continuous professional development.

Similarly, Musa, Anisha, and Mohammed (2022) explored teachers' perceptions of service conditions on their productivity in Kogi State, Nigeria. The study used a descriptive survey design with 200 randomly selected teachers and found no significant difference in teachers' perceptions based on age or academic qualifications. These findings align with previous studies, suggesting that qualifications alone may not be a strong determinant of teachers' perceptions and productivity.

Teachers' Attitudes toward Green Chemistry

Focusing specifically on green chemistry, Jack and Shidawa (2024) examined chemistry teachers' attitudes toward green chemistry in Jalingo, Taraba State. Using a descriptive survey design, they sampled 70 chemistry teachers and assessed attitudes using the Teachers' Attitude towards Green Chemistry Scale (TAGCS). The results showed a generally positive attitude towards green chemistry (grand mean = 3.17). However, statistical analysis revealed no significant difference in attitudes based on years of teaching experience or academic qualifications. This aligns with previous findings indicating that experience and qualifications may not be primary factors in shaping attitudes toward green chemistry. Instead, professional development and targeted training may play a more crucial role in fostering positive attitudes.

Methodology

This study used a descriptive survey research type. This approach was utilized to get a clearer image from the quantitative data. The population comprised chemistry teachers from senior secondary schools in Kwara State, Nigeria. Kwara State has three senatorial districts: Kwara Central, North, and South. The number of chemistry teachers in public senior secondary schools in Kwara State is 472 (Research and Statistics Department, Kwara State Teaching Service Commission, 2023). Proportionate sample technique was used to select 259 chemistry teachers from the three senatorial districts. Two questionnaires (TPGCC and TAGCC) were adapted and adopted from the works of Jusniar Syamsidah and Auliah (2023) and Umanah and Udo (2021). The questionnaires include two sections, A and B. Section A elicited demographic information from respondents, including teaching experience, and teacher qualification. Section B featured ten items in two constructions that sought respondents' perceptions and attitude toward green chemistry with a four-point Likert scale for responses: Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD), with scores of 4, 3, 2, and 1. The instruments were validated by five specialists from Science Education Department, University of Ilorin, Nigeria. The reliability of the interments were carried out using internal consistency reliability, after administering the instruments to 30 respondents that have similar characteristics. Cronbach's alpha for TPGCC and TAGCC yielded coefficients of 0.97 to 0.99. Data obtained were analysed using t-test at a significance level of 0.05.

Result

Hypotheses Testing

H_{01}: There is no significant difference in the perceptions of experienced and less experienced chemistry teachers towards

green chemistry concepts in secondary school chemistry curriculum.

Table 1:*Independent Samples t-test of Teachers' Perceptions of Green Chemistry Concepts based on Experience*

Teachers' Experience	N	X	SD	df	t	Sig. (2tailed)	Remark
Experienced	171	80.02	6.33				
				257	0.17	.101	Not Rejected
Less experience	88	80.35	6.73				

Table 1 presents an independent t-test analysis of teachers' perceptions based on experience. The result revealed that there is no significant difference in the perceptions of experienced and less experienced teachers at a t-value $t_{(257)} = 0.17$, p = 0.101. Since the p-value of 0.10 is greater than .05 alpha level, thus, the stated null hypothesis is not rejected.

H_{02}: There is no significant difference in the perceptions of qualified and unqualified chemistry teachers towards green chemistry concepts in secondary school chemistry curriculum.

Table 2: *Independent Samples t-test of Teachers' Perceptions of Green Chemistry Concepts*

Teachers' Academic Qualification	N	X	SD	df	t	Sig. (2tailed)	Remark
Qualified	204	62.58	8.73				
				257	1.97	.087	Not Rejected
Unqualified	55	62.64	8.64				

Table 2 presents an independent t-test analysis of teachers' perceptions based on qualification**.** The result revealed that there is a significant difference in the perceptions of qualified and unqualified teachers at a t-value $t_{(257)} = 1.97$, p = .087. Since the p-value of .087 is greater than .05 alpha level, thus, the stated null hypothesis is not rejected. .

H_{03}: There is no significant difference in the attitude of experienced and less experienced chemistry teacher towards green chemistry concepts in secondary school chemistry curriculum.

Table 3: *Independent Samples t-test of Teachers' Attitude towards Green Chemistry Concepts in Secondary School Chemistry Curriculum*

Teachers' Experience	N	X	SD	df	t	Sig. (2tailed)	Remark
Experienced	171	78.32	6.33				
				257	0.64	.128	Not Rejected
Less experience	288	78.15	6.28				

Table 3 presents an independent t-test analysis of teachers' attitude based on experience. The result revealed that there is no significant difference in the attitude of experienced and less experienced at a t-value $t_{(257)} = 0.64$, p = 0.128. Since the p-value of 0.128 is greater than .05 alpha level, thus, the stated null hypothesis is not rejected.

H_{04}: There is no significant difference in the attitude of qualified and unqualified chemistry teachers towards green chemistry concepts in secondary school chemistry curriculum.

Table 4: ***Independent Samples t-test of Teachers' Attitude towards Green Chemistry Concepts in Secondary School Curriculum***

Teachers' Academic Qualification	N	X	SD	df	t	Sig. (2tailed)	Remark
Qualified	204	78.30	9.85	257	.77	.091	Not Rejected
Unqualified	55	78.21	9.91				

Table 4 presents an independent t-test analysis of teachers' attitude based on qualification. The result revealed that there is no significant difference in the attitude of qualified and unqualified teachers at a t-value $t_{(257)} = 0.77$, $p = 0.091$. Since the p-value of 0.091 is greater than .05 alpha level, thus, the stated null hypothesis is rejected.

Discussion

This study investigated teachers variables influence on perceptions and attitude towards green chemistry concepts in secondary school curriculum in Kwara state, Nigeria. The findings revealed that there was no significant difference teachers perceptions based on experience towards green chemistry concepts in secondary school chemistry curriculum. This may be due to the lack of safer solvent alternatives in the curriculum. The outcome of this study is in line with the study of Alake (2024) who observed in-service teachers' perceived reasons for chemistry content difficulty in school curriculum reported that there was no significant difference in perception of less experienced and experienced teachers. The findings revealed that there was no significant difference in chemistry teachers' perceptions based on qualification towards green chemistry concepts in secondary school chemistry curriculum. This may be due to teachers, regardless of qualification, may have been exposed to the same chemistry curriculum, which does not extensively cover green chemistry, leading to similar perceptions. The findings of the present study is in line with the study of Oyelekan and Salihu (2022) who examined teachers' knowledge of green chemistry in senior secondary schools indicated that there is no significant difference in knowledge of green chemistry between qualified and unqualified teachers

Also, the findings revealed that there was no significant difference chemistry teachers' attitude based on experience towards green chemistry concepts in secondary school chemistry curriculum. This may be due to the structured nature of the secondary school chemistry curriculum which may not provide significant opportunities for integrating green chemistry, resulting in uniform attitudes among teachers, regardless of their years of experience. The findings of the study is in line with the study of Al-Mashkoor et al. (2021) who examined awareness of chemical innovations among teachers of chemistry. The finding from the study reported that there was no significant differences based on years of service. Contrarily, the finding of the study of Vidushy (2023) on attitude towards teaching among secondary school teachers in relation to teaching competence, locale and teaching experience revealed that there is significant disparities in attitude based on teaching experience.

Furthermore, the findings revealed that there was no significant difference in chemistry teachers' attitude based on qualification towards green chemistry concepts in secondary school chemistry curriculum. This is as a result of lack of exposure to modern and innovative concepts, access to ongoing professional development opportunities, and confidence in teaching abilities and subject knowledge among others. The outcome of this finding is in agreement with Jack and

Shidawa (2024) who examined chemistry teachers' attitude towards green chemistry in Jalingo, Taraba state, Nigeria reported that there was no significant difference in the mean attitude towards green chemistry rating of chemistry teachers based on their academic qualifications.

Conclusion

This study reveals that teaching experience and academic qualifications do not significantly influence chemistry teachers' perceptions or attitudes towards green chemistry concepts. The consistency in their views stems from the limited integration of green chemistry in the curriculum, inadequate professional development, and insufficient resources for safer chemical practices. Addressing these gaps is crucial for effective implementation.

Recommendations

1. The Ministry of Education should revise the secondary school chemistry curriculum to integrate green chemistry concepts with a focus on practical applications and sustainability.
2. Education policymakers should develop clear guidelines and incentives to encourage schools and teachers to adopt green chemistry practices effectively.

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