INTERNATIONAL JOURNAL OF EDUCATIONAL MANAGEMENT (IJEDM)

VOLUME 1, ISSUE 2, JANUARY 2025

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Implementation Strategies of National Policy on Inclusive Education as Perceived by Administrators in Secondary Schools in Port Harcourt Metropolis, Rivers State

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Abstract

The study investigated implementation strategies of National Policy on Inclusive education as perceived administrators in secondary schools in Port-Harcourt Metropolis in Rivers State. Two specific objectives, research questions and two hypotheses guided the study. The study adopted descriptive survey design. The population of the study was 759 school administrators comprising of 718 school administrators in government approved private secondary schools and 41 school principals in public secondary schools in Port Harcourt Metropolis. The sample size of the study was 328 school administrators comprising 287 private school administrators and 41 public school administrators derived through simple random sampling and census techniques. The instrument for data collection was a self-structured questionnaire titled: "Implementation Strategies of Inclusive Education as Perceived by Administrators in Secondary Schools Questionnaire". The instrument was subjected to face and content validity by experts in Department of Educational Management and Measurement and Evaluation. The reliability of the instrument was established using Cronbach Alpha Method which yielded reliability coefficients of 0.70 and 0.81. Mean and standard deviation were used to answer the research questions while z-test was used to test the hypotheses at 0.05 level of significance. The study found that to high extent accessibility and safety and support for inclusive teaching enhance the implementation of inclusive education as perceived by administrators in Port-Harcourt Metropolis, Rivers State. Based on the findings, the study recommended among others that government and school proprietors should make accessibility and safety means available in all schools to accommodate variety of disabilities as this will help create an inclusive learning environment for gifted students, disabled students and others.

Keywords: School Administrators, Strategies, Implementation, National Policy, Inclusive Education

Introduction

The term inclusion in the context of education is often confused to mean special education referring to engagement of persons with physical and mental impairments, such as sensory or mobility limitations, intellectual disabilities, learning disabilities, language disorders, behavior disorders and autism spectrum disorders. Beyond this general perspective, Kirschner, (2015) viewed inclusive education as the deliberate and self-conscious structuring of whole-school and classroom environments so that they are accessible and congenial not

only to students with impairments, but also to those who can face exclusion or disempowerment due to their ethnicity, social class, gender, culture, religion, immigration history or other attributes. That is, inclusive education does not only consider learners with physical disabilities but also those whose learning abilities could be affected by their social background, religion, races, or ethnicity.

The afore-mentioned definitions of inclusive education appear to be misleading and not in tandem with the true meaning of inclusive education as stated in the national policy of inclusive education. The National Policy on Inclusive Education, NPIE (FGN, 2017) puts this confusion to rest as it exhaustively defines the term inclusive education and sets out the parameters to be followed in achieving this noble idea in the country. According to the policy, inclusive Education "has been internationally recognized as a means of attaining equity, justice, and quality education for all learners, especially those who have traditionally excluded from mainstream education for reasons of disability, ethnicity, gender, giftedness or other characteristics (National Policy of Inclusive Education, 2017). While others define inclusive education with focus on only disabilities, ethnicity and gender, the policy included also the gifted children. This shows that inclusive education is not only focused on students' with learning difficulties but also those who have the ability to learn at a faster pace than others in the classroom.

Inclusive education encompasses a range of aspects that promote equity, access, and participation for all students in the educational environment. It involves valuing diversity, providing accessibility, individualizing instruction, fostering collaboration, promoting a positive school climate, supporting social and emotional learning, engaging parents and communities, providing policy and systemic support, conducting ongoing assessment and monitoring, and continuously improving practices to ensure that all students are included and empowered in their educational journey

This position supports the various positions of global agencies as stated earlier and keys in with the position of the, Jomtein conference on Education for All (EFA) which emphasized urgent priority to ensure access to and improve the quality of Education for all children (Lawal & Isah, 2022). Hence, the need for education systems that include all students; welcomes and supports them to learn, whoever they are and whatever their abilities or requirements. This means making sure that teaching, the curriculum, school buildings, classrooms, play areas, transport and toilets are appropriate for all children at all levels. It means all children learn together in the same schools.

The creation of inclusive schools remains a major challenge facing education systems around the world (Mitchell, 2015). Inclusive education remains a multi-level and complex problem, because the development of inclusive practices in schools is not well understood (Anastasiu & Kaufman, 2012; Winzer & Mazurek, 2017). Inclusive education not only affects the principle and nature of education provided to students with disabilities, but also requires a cross-sectional study of the broader goals of education, the purpose of schools, the nature of the curriculum, assessment methods and schools' adaptation to diversity. The way ordinary schools respond to students with disabilities can be an indicator of the quality of education for all students (UNESCO, 2015). Weber and Ruch (2012) affirm that a good school is beneficial for all students and contributes to the success of all students. This requires modifying school strategies and the school environment to adapt to the diversity of students" (Agarwal & Chakravarti, 2014).

The evidence underlying Inclusive education in African countries is weak and fragmentary (Howgego, *et al.,* 2014). Inaccessible environments, the lack of reasonable housing, negative attitudes, discriminatory application and admission procedures, as well as the lack of policies and choices regarding people with disabilities, disadvantage students with disabilities in Africa (Chataika, *et al.,* 2012). Although Nigeria adopted an Inclusive education policy in 2004, it is facing socio-economic obstacles, insufficient funding, a lack of infrastructure and a shortage, the willingness of teachers to practice inclusive practices, aggravated by administrative problems in schools. Many schools have dilapidated buildings without libraries, laboratories and other auxiliary facilities (Ibok, 2015; Igbokwe et al., 2014).

Similarly, inclusive education in Uganda faces serious problems, including negative cultural attitudes towards disability, a lack of resources, insufficient funding and insufficient training of teachers in inclusive practices, as well as a lack of mobile devices, which hinders the allocation of resources to educational institutions (Abimanyi & Mannan, 2014). Nigeria is one of the African countries that has made considerable progress in Inclusive education (Nungu, 2010). The National policy on education (2004) states: "access to education shall be provided and inclusive education or integration of special classes and unit into ordinary/public schools under the UBE scheme" Subsequently several policies have focused on inclusive education in the nation finally culminating in the National policy on inclusive education in 2017. The government has adopted and supported the practice of Inclusive education by incorporating various international agreements into its laws (Njoka et al., 2012).

The policy envisions "a society with an inclusive education system with unhindered access to quality education and active participation of all learners in the same safe school environment." (National Policy on Inclusive Education FGN, 2017) To achieve this, it proposes to "engage relevant stakeholders, create awareness, build capacity, strengthen service delivery, monitor and ensure implementation for the provision of standardized, qualitative and accessible education system for sustenance of equal opportunities and participation for all learners" (National Policy on Inclusive Education FGN, 2017). Despite the Inclusive education policy, many learners are still excluded from the school system or under provided for – Gifted children, children with special needs, students who by virtue of socio economic, political, gender or other status etc.

Statement of the Problem

Nigerian educational system has suffered greatly due to lack of political will by leaders to overhaul, restructure and reposition the educational system. The underfunding of the sector affects everything from qualified teachers, educational administrators and managers to structures, resources and equipment. Inclusive education has faced many challenges in the country due quite a number of factors related to the governments, parents, pupils/teachers and the community (Lawal & Isah, 2022). The failure to effectively implement inclusive education policy is quiet notable in high number of disabled children without educational background, rise in ethnic discrimination in Nigerian schools, students without proper adjustment to school environment thereby leading to low academic performance, segregation of gifted children from others and many more. The question is to what extent would the laid down strategies in the national inclusive education policy enhance the implementation of inclusive education in secondary schools? To provide answers to this question, made the researcher to investigate the strategies school administrators use for the implementation of the National Policy on Inclusive Education in secondary schools in Port-Harcourt Metropolis, Rivers State.

Purpose of the Study

The purpose of the study was to examine the implementation strategies of National Policy on Inclusive Education as perceived by administrators in secondary schools in Port Harcourt Metropolis, Rivers State. Specifically, the study sought to:

1. ascertain the extent to which accessibility and safety enhance the implementation of inclusive education as perceived by administrators in secondary schools in Port-Harcourt Metropolis, Rivers State.

2. establish the extent to which support for inclusive teaching enhance the implementation of inclusive education as perceived by administrators in Port-Harcourt Metropolis, Rivers State.

Research Questions

The following research questions guided the study:

1 To what extent does accessibility and safety enhance effective implementation of inclusive education as perceived by administrators in secondary schools in Port-Harcourt Metropolis, Rivers State?

2 To what extent does support for inclusive teaching enhance the implementation of inclusive education as perceived by administrators in Port-Harcourt Metropolis, Rivers State?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. There is no significant difference in the mean responses of private and public school administrators on the extent accessibility and safety enhance effective implementation of inclusive education as perceived by administrators in secondary schools in Port-Harcourt Metropolis, Rivers State.

2. There is no significant difference in the mean responses of private and public school administrators on the extent support for inclusive teaching enhance the implementation of inclusive education as perceived by administrators in Port-Harcourt Metropolis, Rivers State.

Methodology

The study adopted a descriptive survey design. The population of the study was 759 school administrators comprising 718 school administrators in government approved private secondary schools and 41 school principals in public senior secondary schools in Port -Harcourt Metropolis. The sample size of the study was 328 school administrators comprising 287 private school administrators and 41 public school administrators derived through purposive and census sampling techniques. The purposive sampling technique was adopted in selecting 287 private secondary school administrators whose schools were duly registered and approved by the State Government. The entire 41 administrators from the public senior secondary schools were studied without sampling. The instrument for data collection was a self-structured questionnaire titled: "Implementation strategies of National Policy on Inclusive Education as

Perceived Administrators in Secondary Schools Questionnaire (ISNPIEPAQ)". The instrument was designed on a 4-point rating scale of Very High Extent (VHE), High Extent (HE), Low Extent (LE) and Very Low Extent (VLE) with 4, 3, 2 and 1 points respectively. The instrument was subjected to face and content validity by 2 experts in the Department of Educational Management and Measurement and Evaluation. The reliability of the instrument was established using Cronbach Alpha statistics which yielded reliability indexes 0.70 and 0.81. Mean and standard deviation were used to answer the research questions with a criterion mean of 2.50. Questionnaire items with ratings below 2.50 denoted 'Low Extent' while 2.50 and above signified 'High Extent'. The hypotheses were tested using z-test at 0.05 level of significance. Analyzed data therefore with calculated z-value greater than the z-critical value of ±1.96 was rejected and below was accepted.

Result

Research Question 1: To what extent does accessibility and safety enhance implementation of inclusive education in secondary schools in Port Harcourt Metropolis of Rivers State?

Table 1:   Mean Responses of Private and Public School Administrators on the Extent Accessibility and Safety Enhance Implementation of Inclusive Education in Secondary Schools in Port Harcourt Metropolis of Rivers State.

S/No	Item	Private = 99			Public = 38		
		Mean	S.D	Rmk	Mean	S.D	Rmk
1	Strengthening protection guidelines at school and community would aid implementation of Inclusive Education Policy.	3.04	1.03	HE	3.16	0.93	HE
2	Providing easy access to first-aid and other relevant health care facilities in the school would enhance implementation of Inclusive Education Policy.	2.86	0.93	HE	2.97	0.93	HE
3	Involving parents and school management committee in the provision of school security would facilitate implementation of Inclusive Education Policy.	3.04	0.92	HE	3.18	1.05	HE
4	Creating access to library materials on the implementation techniques of inclusive education policies would ensure implementation of Inclusive Education Policy.	2.66	1.09	HE	3.18	1.05	HE
5	Ensuring constant power supply through alternative sources such as solar system would guarantee implementation of Inclusive Education Policy.	3.07	0.98	HE	3.13	1.15	HE
6	Guaranteeing inclusive and accessible recreational and sport facilities would aid implementation of Inclusive Education Policy.	3.15	0.95	HE	2.84	1.11	HE
7	Providing of inclusive and accessible infrastructural facilities in the school such as classrooms, hostels, laboratory, toilets etc would facilitate implementation of Inclusive Education Policy.	3.05	0.99	HE	3.21	0.92	HE
8	Rehabilitating existing classrooms and other school facilities to be accessible by all kinds of learners would ensure implementation of Inclusive Education Policy.	3.36	0.90	HE	2.63	1.09	HE

9	Encouraging all registered schools to accept all school aged children regardless of their peculiarities would help implementation of Inclusive Education Policy.	3.30	0.78	HE	2.87	1.00	HE
10	Enhancing report mechanisms to prevent all sorts of abuse, gender-based violence in the school would guarantee implementation of Inclusive Education Policy.	3.20	0.95	HE	2.68	1.08	HE
	Grand Mean		**3.07**			**2.99**	

Field Survey, 2024   S.D-Standard Deviation; HE- High Extent

Table 1 shows the mean responses on the extent accessibility and safety enhance implementation of inclusive education in secondary schools in Rivers State. The criterion mean of 2.50 shows that at high extent the following enhance implementation of inclusive education in secondary schools. Strengthening protection guidelines at school and community (3.04 & 3.16), providing easy access to first-aid and other relevant health care facilities in the school (2.86 & 2.97), involving parents and school management committee in the provision of school security (3.04 & 3.18), creating access to library materials on the implementation techniques of inclusive education policies (2.66 & 3.18), ensuring constant power supply through alternative sources such as solar system (3.07 & 3.13), guaranteeing inclusive and accessible recreational and sport facilities (3.15 & 2.84), providing of inclusive and accessible infrastructural facilities in the school such as classrooms, hostels, laboratory, toilets e.t.c. (3.05 & 3.21), rehabilitating existing classrooms and other school facilities to be accessible by all kinds of learners (3.36 & 2.63), encouraging all registered schools to accept all school aged children regardless of their peculiarities (3.30 & 2.87), and enhancing report mechanisms to prevent all sorts of abuse, gender-based violence in the school (3.20 & 2.68). The grand mean scores of 3.07 & 2.99 for private school and public school administrators indicates that stakeholders' engagement and advocacy strategies enhance the implementation of Inclusive Education in secondary schools in Port Harcourt Metropolis of Rivers State to a high extent.

Research Question 2: To what extent does support for inclusive teaching enhance the implementation of inclusive education secondary schools in Port Harcourt Metropolis of Rivers State?

Table 2:   Mean Responses of Private and Public School Administrators on the Extent Support for Inclusive Teaching Would Enhance the Implementation of Inclusive Education in Port Harcourt Metropolis of Rivers State.

		Private = 99			Public = 38		
S/No	Item	Mean	S.D	Rmk	Mean	S.D	Rmk
1	Creating teacher/learner ratio that is result oriented would improve implementation of Inclusive Education Policy.	2.87	1.06	HE	3.19	1.00	HE

2	Engagement of other service providers for special needs learners would aid implementation of Inclusive Education Policy.	3.34	0.95	HE	3.14	0.89	HE
3	Regular promotion of teachers/facilitators and supporting staff members would assist implementation of Inclusive Education Policy.	2.89	0.94	HE	3.12	1.03	HE
4	Recruitment of relevant personnel including: counsellors, care givers, audiologists, sign language teachers and interpreters, social workers, low vision experts, psychologists, physiotherapists would facilitate implementation of Inclusive Education Policy.	3.21	1.00	HE	3.09	0.83	HE
5	Adapting teaching methods and local languages peculiar to the environment to enhance teaching and learning would enhance implementation of Inclusive Education Policy.	2.89	1.02	HE	3.11	1.18	HE
6	Provide appropriate specialized facilities to address identified learning difficulties would support implementation of Inclusive Education Policy.	3.05	1.00	HE	3.00	0.92	HE
7	Allocate flexible extra time and appropriate methods for testing children who have difficulty accessing standard tests would ensure implementation of Inclusive Education Policy.	3.16	0.90	HE	3.00	1.02	HE
8	Provision of appropriate musical and laboratory facilities/materials to support teaching and learning would aid implementation of Inclusive Education Policy.	2.92	1.06	HE	3.19	1.01	HE
9	Provision of basic instructional materials for children with disabilities e.g. Braille materials for learner with visual impairment, hearing aid, magnifiers, large print materials, assistive technology/devices would help implementation of Inclusive Education Policy.	3.03	0.99	HE	2.82	0.91	HE
10	Provision of school/home support especially for learners with severe and multiple disabilities would facilitate implementation of Inclusive Education Policy.	3.26	0.99	HE	3.11	1.06	HE
	Grand Mean	**3.06**			**3.08**		

Field Survey, 2024   S.D-Standard Deviation; HE-High Extent

Table 2 shows the mean responses on the extent support for inclusive teaching enhance the implementation of inclusive education in secondary schools in Port-Harcourt Metropolis, Rivers State. Based on the criterion mean value of 2.50, the analysis showed that at high extent the following would enhance the implementation of inclusive education Creating teacher/learner ratio that is result oriented (2.87 & 3.19), engagement of other service providers for special needs learners (3.34 & 3.14), regular promotion of teachers/facilitators and supporting staff members (2.89 & 3.12), recruitment of relevant personnel including: counsellors, care givers, audiologists, sign language teachers and interpreters, social workers, low vision experts, psychologists, physiotherapists (3.21 & 3.09), adapting teaching methods and local languages peculiar to the environment to enhance teaching and learning (2.89 & 3.11),

provide appropriate specialized facilities to address identified learning difficulties (3.05 & 3.00), allocate flexible extra time and appropriate methods for testing children who have difficulty accessing standard tests (3.16 & 3.00), provision of appropriate musical and laboratory facilities/materials to support teaching and learning (2.92 & 3.19), provision of basic instructional materials for children with disabilities e.g. Braille materials for learner with visual impairment, hearing aid, magnifiers, large print materials, assistive technology/devices (3.03 & 2.82), and provision of school/home support especially for learners with severe and multiple disabilities (3.26 & 3.11). The grand mean scores of 3.06 & 3.08 for private school and public School Administrators indicates that stakeholders' engagement and advocacy strategies would enhance the implementation of Inclusive Education in secondary schools in Port-Harcourt Metropolis, Rivers State at high extent.

Hypotheses

H0₁: There is no significant difference in the mean responses of private and public school administrators on the extent to which accessibility and safety enhance implementation of inclusive education in secondary schools in Port Harcourt Metropolis, Rivers State.

Table 3: z-test Analysis Between the Mean Responses of Private and Public School Administrators on the Extent Accessibility and Safety Enhance Effective Implementation of Inclusive Education in Secondary Schools in Port-Harcourt Metropolis, Rivers State.

Administrators	N	Mean	S.D	A	Df	z-cal	z-crit	Rmk
Private	99	3.07	0.95					
				0.05	135	0.42	±1.96	Failed to reject
Public	38	2.99	1.03					

Research Data Output, 2024

Table 3 presents the z-test analysis on the extent accessibility and safety enhance effective implementation of inclusive education in secondary schools in Port-Harcourt Metropolis, Rivers State. The z-calculated value obtained was 0.42 while the z-crit was ±1.96 at 0.05 level of significance. Since the z-cal is less than the z-critical the hypothesis was therefore upheld. That is, there is no significant difference in the mean responses of private and public school administrators on the extent to which accessibility and safety enhance implementation of inclusive education in secondary schools in Port Harcourt Metropolis, Rivers State.

H0₂: There is no significant difference in the mean responses of private and public school administrators on the extent support for inclusive teaching enhance the implementation of inclusive education in Port-Harcourt Metropolis, Rivers State.

Table 4: z-test Analysis Between the Mean Responses of Private and Public School Administrators on the Extent Support for Inclusive Teaching Enhance the Implementation of Inclusive Education in Port-Harcourt Metropolis, Rivers State

Administrators	N	Mean	S.D	α	Df	z-cal	z-crit	Rmk
Private	99	3.06	0.99					
				0.05	135	-0.11	±1.96	Failed to reject
Public	38	3.08	0.99					

Research Data Output, 2024

Table 4 presents the z-test analysis on the extent support for inclusive teaching enhance the implementation of inclusive education in Port-Harcourt Metropolis, Rivers State. The z-calculated value obtained was -0.11 while the z-crit was ±1.96 at 0.05 level of significance for two-tailed test. Since the z-cal is less than the z-critical the hypothesis was not rejected. That is, there is no significant difference in the mean responses of private and public school administrators on the extent support for inclusive teaching enhance the implementation of inclusive education in Port-Harcourt Metropolis, Rivers State.

Discussion of Findings

The result obtained from research question on Table 1 revealed that accessibility and safety enhance the implementation of Inclusive Education in secondary schools in Port Harcourt Metropolis of Rivers State to a high extent with grand mean scores of 3.07 and 2.99. The corresponding hypothesis 1 on Table 3 shows no significant difference in the mean responses of private and public school administrators on the extent to which accessibility and safety enhance implementation of inclusive education in secondary schools in Port Harcourt Metropolis, Rivers State with z-calculated of 0.42 which was less that z-critical value of ±1.96. The finding is related to Agarwal and Chakravarti, (2014) implementation of inclusive education would require modifying school strategies and the school environment to adapt to the diversity of students. It is by this modification that variety of students would be motivated to enroll in an inclusive school. Also, Njoka et al (2012) who stated that ensuring the safety and accessibility of students is essential in an inclusive environment whereby variety of learners would struggle for their survival in a competitive environment.

The findings of the study for research question two on Table 2 revealed that support for inclusive teaching enhance the implementation of Inclusive Education in secondary schools in Port Harcourt Metropolis of Rivers State to a high extent with grand mean scores of 3.06 and

3.08. The corresponding hypothesis 2 on Table 4 shows no significant difference in the mean responses of private and public school administrators on the extent to which support for inclusive teaching enhance implementation of inclusive education in secondary schools in Port Harcourt Metropolis, Rivers State with z-calculated of -0.11 which was less that z-critical value of ±1.96. This finding aligns with Okyere, et al. (2019) who stated that inclusion goes beyond teachers, rehabilitation professionals (i.e. occupational therapists) and educational professionals should partner to identify practical solutions to the challenges of creating inclusive environments for children with special education needs.

Conclusion

Based on the findings of this study, it was concluded that to a high extent accessibility and safety and creating support for inclusive teaching, are the strategies to enhance implementation of inclusive education in secondary schools in Port Harcourt Metropolis, Rivers State.

Recommendations

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

1. Government and school proprietors should make accessibility and safety means available in all schools to accommodate variety of disabilities as this will help create an inclusive learning environment for gifted students, disabled students and others.

2. Government in collaboration with the school administrators and non-governmental organizations should help equip teachers in secondary schools with resources to support inclusive teaching in the classroom as this could make the implementation process of inclusive education easier.

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International Journal of Educational Management, Rivers State University.

Role of Triple Helix Partnerships in Enhancing Educational Infrastructure for Sustainable Development in Rivers West Senatorial District

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Abstract

This study examined the role of the triple helix partnership in enhancing educational infrastructure for sustainable development in the Rivers West Senatorial District. The study adopted a descriptive research design. The population of the study was 160 principals of public secondary schools in Rivers west senatorial district. Census sampling technique was adopted due to small population size. Three research questions were developed and three hypotheses tested at 0.05 level of significance. The instrument used for data collection was a validated structured questionnaire. The reliability coefficients was found to be 0.71, 0.77, and0.75 respectively. Data obtained from the administration of the instrument was analysed using mean, standard deviation to answer the research questions and z-test statistics was used to test the hypotheses at 0.05 level of significance. The findings of this study revealed that, a general agreement on the role of government in improving educational infrastructure, with respondents from both Junior and Senior Secondary Schools acknowledging the government's significant contributions. However, there is notable disagreement on the roles of academia and industry, indicating perceived gaps between their potential and actual impacts. Based on these findings, it was recommended among others that, there should be increased collaboration between these sectors and educational institutions in Rivers west senatorial district and industries should be encouraged to increase their investments in educational infrastructure, including funding modern facilities and providing technological resources in Rivers West Senatorial district.

Keywords: Academia, Educational Infrastructure, Government, Industry, Sustainable Development, Triple Helix.

Introduction

Educational infrastructure encompasses all the physical and organizational structures needed for the effective operation of educational institutions. It includes buildings, classrooms, laboratories, libraries, sports facilities, and ICT resources, as well as the management and support systems that ensure these facilities are utilized optimally. The quality and availability of educational infrastructure significantly impact the learning environment, influencing both teaching and learning outcomes. Modern educational infrastructure goes beyond mere physical structures, integrating technological advancements and innovative design to foster conducive

learning atmosphere that supports contemporary educational needs (Ineye-Briggs, Uriri & Nwisagbo, 2023).

According to Farrell and Heyneman (1989), "Educational infrastructure refers to the basic physical and organizational structures and facilities needed for the operation of a school or educational system." They emphasize that this includes not only the physical buildings but also the ancillary facilities and resources required to support teaching and learning processes, such as libraries, laboratories, and technological equipment. A more contemporary definition by Earthman (2004) states, "Educational infrastructure encompasses the entirety of the physical elements that support the educational system, including the design and condition of school buildings, availability of learning materials, and the accessibility of digital technologies." Earthman highlights the critical role that the quality and maintenance of these physical elements play in student performance and overall educational outcomes.

Both definitions underline the importance of physical and organizational structures in supporting educational systems. Farrell and Heyneman's definition provides a foundational view, emphasizing the broad scope of infrastructure necessary for school operations. This includes basic physical components and essential resources for effective teaching and learning. Earthman extends this perspective by incorporating modern elements such as digital technologies and the significance of infrastructure quality on educational outcomes. This reflects the evolving nature of educational infrastructure, acknowledging the impact of technological advancements and the condition of facilities on student success.

Educational infrastructure refers to the comprehensive array of physical, technological, and organizational resources and facilities that underpin the functioning of educational institutions. This includes traditional physical buildings and classrooms, advanced technological tools, learning materials, and the systemic support required to maintain and enhance the educational environment. High-quality educational infrastructure is pivotal in creating an effective learning environment that meets contemporary educational demands and fosters academic achievement and holistic development. A crucial element in developing and sustaining high-quality educational infrastructure is the Triple Helix Partnership, which involves collaboration among academia, industry, and government. This partnership ensures that educational institutions are equipped with cutting-edge facilities and resources, fostering innovation and aligning educational outcomes with societal and economic needs. Through such collaboration,

educational infrastructure can be continually enhanced to support holistic empowerment and sustainable development.

The triple helix partnership is a model of innovation that emphasizes collaboration among three key sectors: academia, industry, and government. Each of these sectors plays a distinct yet interdependent role in driving innovation and development.

Academia

Institutions of higher learning contribute through research and development, knowledge dissemination, and training of skilled professionals. Universities and colleges provide the intellectual foundation, conduct cutting-edge research, and develop new technologies that can be applied in various industries. They also prepare the workforce by equipping students with relevant skills and knowledge (Nwile & Inukan-Adebayo, 2022; Okojie, 2021).

Industry

Businesses and industries implement innovations, provide funding for research, and offer practical applications for academic discoveries (Nduka, 2022). Industry partners bring real-world challenges and market needs to the table, ensuring that research is relevant and practical. They also provide financial support and resources for research projects and help in the commercialization of new technologies.

Government

The government creates policies, provides funding, and ensures a conducive environment for collaboration between academia and industry. Governments facilitate partnerships by offering grants, creating favourable policies, and ensuring regulatory support (Ebiere, 2023). They also help in aligning educational outcomes with national development goals.

Generally, triple helix partnerships play pivotal role in enhancing educational infrastructure, which is essential for sustainable development. This collaboration fosters an environment where innovation, resource sharing, and strategic planning converge to create a robust educational ecosystem. Triple Helix Partnerships encourage joint research initiatives that lead to innovative solutions for educational infrastructure. For instance, universities can work with tech companies to develop advanced learning technologies, while governments provide the necessary funding and policy support. In Nigeria, collaborations between universities and tech

firms have led to the development of e-learning platforms that enhance access to education, especially in remote areas (Okojie, 2021).

Similarly, in area of resource sharing and capacity building; triple helix partnerships significantly improve the quality and availability of educational facilities. This includes constructing modern classrooms, laboratories, and digital libraries. The partnership between Rivers State University and local industries has led to the establishment of state-of-the-art laboratories that support both academic research and industrial innovation (Nduka, 2022).

Also, governments, through Triple Helix Partnerships, can create policies that incentivize investments in educational infrastructure. This strategic alignment ensures that educational institutions are well-equipped to meet the demands of the modern economy. The Bayelsa State government's collaboration with universities and private sector stakeholders has resulted in policies that promote sustainable practices in educational infrastructure development, such as the use of renewable energy sources in schools (Osagie, 2024; Ebiere, 2023; Nduka, 2021).

Academia's contribution to educational infrastructure and sustainable development is well-documented through various research and innovation initiatives. For instance, the development of e-learning platforms by Nigerian universities has significantly improved educational access in remote areas, highlighting the transformative potential of academic research (Okojie, 2021). Additionally, specialized training programs in universities help build the capacity of educators and administrators. The introduction of these programs in Bayelsa State has equipped educational professionals with the skills needed to maintain and enhance infrastructure (Ebiere, 2023). Another study emphasized the impact of community engagement projects led by universities in Rivers State, which have successfully upgraded local school facilities (Nduka, 2022). Furthermore, a study by Bassey et al. (2018) demonstrated how Nigerian universities have incorporated sustainability into their campus operations, influencing broader infrastructural improvements (Bassey, Esirah, & Isaac, 2018).

Industries play a crucial role in supporting educational infrastructure through funding, technological innovations, and aligning educational outcomes with market needs. Local industries in Rivers State have invested in university laboratories, enhancing research capabilities (Nduka, 2022). Additionally, partnerships with tech companies have led to the development of advanced educational technologies, significantly improving access to quality education (Okojie, 2021). A study by Adejumo and Alade (2019) illustrated how industry

partnerships in Nigeria have facilitated the construction of modern educational facilities, thus enhancing the learning environment (Adejumo & Alade, 2019). In Edo State, collaborations between local businesses and educational institutions have established vocational training centers, which have been crucial in boosting employment and supporting economic growth (Osagie, 2024). Moreover, research by Akinwale (2020) showed how industry-funded projects have led to the integration of renewable energy solutions in school infrastructures, promoting sustainability (Akinwale, 2020).

Government intervention is essential for developing and maintaining educational infrastructure through policy formulation, funding, and regulatory oversight. The Bayelsa State government's policies promoting renewable energy in schools have set a precedent for sustainable infrastructure (Ebiere, 2023). Government funding has been critical in constructing and maintaining educational facilities, ensuring access to quality education, especially in underserved areas (Okojie, 2021). Regulatory bodies established by the Nigerian government ensure that educational infrastructures meet national standards for safety and quality (Nduka, 2022). A study by Obasi and Ekwueme (2016) highlighted how government policies have facilitated the development of ICT infrastructure in schools, enhancing digital learning (Obasi & Ekwueme, 2016). Additionally, research by Onuoha (2022) emphasized the role of government grants in supporting infrastructure projects in rural schools, thereby reducing educational disparities (Onuoha, 2022). Another example is the Nigerian government's National Policy on Education, which has been instrumental in driving infrastructural development across educational institutions nationwide (Federal Ministry of Education, 2018).

While the roles of academia, industry, and government in enhancing educational infrastructure for sustainable developments are well-documented, several gaps and unresolved issues remain that need to be addressed to fully leverage their potential contributions.

Despite the significant strides made by academia in developing e-learning platforms, there is a gap in the widespread adoption and integration of these technologies across all educational institutions. The disparity in access to these platforms between urban and rural areas highlights the need for more inclusive strategies that ensure equitable distribution of technological resources. Furthermore, while specialized training programs have equipped educators with essential skills, there is a need for continuous professional development to keep pace with rapidly evolving educational technologies and methodologies. The impact of community

engagement projects also varies significantly, suggesting that a more systematic approach is needed to ensure consistent outcomes across different regions.

Secondly, industry partnerships have undoubtedly enhanced educational infrastructure through funding and technological innovations. However, the sustainability of these initiatives often depends on the longevity and stability of these partnerships. There is a need for more sustainable models of collaboration that go beyond short-term projects and ensure long-term support for educational institutions. Additionally, while industry-funded renewable energy projects have been successful, their scalability and replicability in different regions remain challenges. Ensuring that these initiatives can be adapted and implemented across various contexts is crucial for their broader impact.

Lastly, Government intervention has been pivotal in shaping policies, funding educational infrastructure, and ensuring regulatory compliance. However, the implementation of government policies often faces challenges such as bureaucratic delays, corruption, and lack of accountability. These issues can hinder the effective deployment of resources and the timely completion of infrastructure projects. Moreover, while government funding has improved access to education in underserved areas, there remains a significant gap in meeting the infrastructure needs of all educational institutions. A more transparent and efficient allocation of resources is necessary to address these disparities. Based on the aforementioned background, the researcher intends to examine the role of triple helix partnership in enhancing educational infrastructure for sustainable development in Rivers West Senatorial District.

Statement of the Problem

Despite numerous efforts to improve educational infrastructure in the Rivers West Senatorial District, many schools continue to struggle with inadequate facilities, out-dated technologies, and insufficient support systems. Students and teachers in this region face daily challenges such as overcrowded classrooms, lack of access to modern learning tools, and poorly maintained buildings, which collectively hinder effective teaching and learning processes. These deficiencies not only influence the quality of education but also limit the potential for sustainable development within the community.

The persistent inadequacies in educational infrastructure have left many students underprepared for higher education and the workforce, while educators are often overwhelmed and under-resourced. This situation is exacerbated by a lack of cohesive collaboration among key

stakeholders: academia, industry, and government. While each sector has made isolated contributions, their efforts have not been effectively integrated to create a holistic and sustainable improvement in educational infrastructure. Given these observations, there is an urgent need to examine the role of the triple helix partnership— the collaboration between academia, industry, and government in enhancing educational infrastructure for sustainable development in the Rivers West Senatorial District.

Purpose of the Study

The main objective of this study is to examine the role of the triple helix partnership in enhancing educational infrastructure for sustainable development in the Rivers West Senatorial District. Specifically, the study sought to examine the role of:

1. Academia in enhancing educational infrastructure for sustainable development in Rivers West senatorial district.
2. Industry in enhancing educational infrastructure for sustainable development in Rivers West senatorial district.
3. Government in enhancing educational infrastructure for sustainable development in Rivers West senatorial district.

Research Questions

The following research questions guide the study

1. What is the role of academia in enhancing educational infrastructure for sustainable development in Rivers West senatorial district?
2. What is the role of industry in enhancing educational infrastructure for sustainable development in Rivers West senatorial district?
3. What is the role of government in enhancing educational infrastructure for sustainable development in Rivers West senatorial district?

Hypotheses

The corresponding null hypotheses formulated are statistically tested at 0.05 level of significance.

1. There is no significant difference in the mean scores of Junior and secondary respondents on the role of academia in enhancing educational infrastructure for sustainable development in Rivers West senatorial district.

2. There is no significant difference in the mean scores of Junior and secondary respondents on industry in enhancing educational infrastructure for sustainable development in Rivers West senatorial district.

3. There is no significant difference in the mean scores of Junior and secondary respondents on role of government in enhancing educational infrastructure for sustainable development in Rivers West senatorial district.

Methodology

The research design adopted for this study is descriptive design. According to Nwankwo (2013), descriptive survey design is a type of design where the researcher collects data from a large sample drawn from a given population and describes certain features of the sample as they are at the time of the study which is of interest to the researcher. The descriptive survey design was considered appropriate for this study because the data for this study was collected from sample drawn from a large population to examine the role of triple helix model in educational infrastructure for sustainable development in Rivers West senatorial district. The population for this study is 160 principals of public secondary schools, which comprised of 80 Junior and 80 senior secondary schools in Rivers west senatorial district. There was no sample as the researcher used the entire population for the study. The instrument used for data collection was "Triple Helix Partnership and Educational Infrastructure for Sustainable Development Questionnaire (THPEISDQ) THPEISDQ is made of 21 items developed on a five point modified rating scale of Strongly Agree (SA-4), Agree (-3), Disagree (D-2) Strongly Disagree (SD-1), and Neutral (0). The instrument was subjected to content and face validity and reliability test which gave a coefficient of stability of 0.71, 0.77, and0.75 respectively. The administration of the instrument was personally carried out by the researcher and seven research assistants. Data gathered for research questions to three were analyzed using mean and standard deviation and formulated null hypotheses tested with Z-test at 0.05 level of significance.

Results

Research Questions 1: What is the role of academia in enhancing educational infrastructure for sustainable development in Rivers West senatorial district?

Table 1: Summary of mean scores on academia in enhancing educational infrastructure for sustainable development in Rivers West senatorial district

S/No	role of academia in enhancing educational infrastructure for sustainable development.	JSS		Decision	SSS		Decision
		$\bar{X}$	SD		$\bar{X}$	SD	

No.	Statement	Mean	SD	Remark	Mean	SD	Remark
1.	Academia significantly contributes to the development of educational infrastructure in Rivers West senatorial district.	2.40	0.61	Disagreed	2.43	0.51	Disagreed
2.	University-led research projects have a positive impact on the quality of educational facilities in the region.	2.49	0.71	Disagreed	2.35	0.62	Disagreed
3.	Collaboration between academia and local government enhances sustainable development of educational infrastructure.	2.54	0.71	Agreed	2.65	0.73	Agreed
4.	Academics play a crucial role in advocating for policies that improve educational infrastructure in Rivers West	2.50	0.76	Agreed	2.90	0.44	Agreed
5.	Academic institutions in Rivers West are adequately funded to support sustainable development initiatives	2.79	0.50	Agreed	2.95	0.22	Agreed
6	Academia provides necessary training and resources to educators for maintaining and improving educational infrastructure.	2.18	0.75	Disagreed	2.15	0.73	Disagreed
7	Academic research in sustainable development is effectively translated into practical improvements in educational infrastructure.	2.14	0.76	Disagreed	2.10	0.84	Disagreed
	Average Mean/SD	**2.45**	**0.68**		**2.49**	**0.58**	

Table 1 presents a summary of mean scores and standard deviations (SD) on the role of academia in enhancing educational infrastructure for sustainable development in Rivers West senatorial district, comparing the views of Junior Secondary School (JSS) and Senior Secondary School (SSS) respondents. The overall perception from both JSS and SSS respondents indicates a slight disagreement on the role of academia in enhancing educational infrastructure for sustainable development, as reflected by the average mean scores (2.45 and 2.49). The findings indicate that while there is agreement on certain roles of academia, such as collaboration with local government and advocating for policies, there is notable disagreement on the significant contributions of academia, the impact of university-led research projects, provision of necessary training, and effective translation of academic research into practical improvements. This

suggests a perceived gap between the potential role of academia and its current impact on enhancing educational infrastructure for sustainable development in Rivers West senatorial district.

Research Questions 2: What is the role of industry in enhancing educational infrastructure for sustainable development in Rivers West senatorial district?

Table 2: Summary of mean scores on role of industry in enhancing educational infrastructure for sustainable development in Rivers West senatorial district

S/No	Role of industry in enhancing educational infrastructure for sustainable development.	JSS		Decision	SSS		Decision
		$\overline{X}$	SD		$\overline{X}$	SD	
8.	Industry partnerships significantly contribute to the development of educational infrastructure in Rivers West senatorial district.	2.30	0.61	Disagreed	2.40	0.51	Disagreed
9.	Investments from industries have a positive impact on the quality of educational facilities in the region.	2.19	0.71	Disagreed	2.15	0.62	Disagreed
10.	Collaboration between industry and academia enhances sustainable development of educational infrastructure.	2.14	0.71	Disagreed	2.15	0.73	Disagreed
11	Industries play a crucial role in funding projects that improve educational infrastructure in Rivers West.	2.10	0.76	Disagreed	2.30	0.44	Disagreed
12	Industry-led initiatives are essential for the sustainable development of educational infrastructure.	2.79	0.50	Agreed	2.95	0.22	Agreed
13	Industries provide necessary resources and expertise for maintaining and improving educational infrastructure.	2.18	0.75	Disagreed	2.15	0.73	Disagreed
14	Industry-community partnerships are vital for the sustainable development of educational infrastructure in Rivers West.	2.54	0.76	Agreed	2.50	0.84	Agreed
	Average Mean/SD	**2.32**	**0.71**	**Disagreed**	**2.37**	**058**	**Disagreed**

Table 2 presents a summary of mean scores and standard deviations (SD) on the role of industry in enhancing educational infrastructure for sustainable development in Rivers West senatorial district, comparing the views of Junior Secondary School (JSS) and Senior Secondary School (SSS) respondents. The overall perception from both JSS and SSS respondents indicates a general disagreement on the role of industry in enhancing educational infrastructure for sustainable development, as reflected by the average mean scores (2.32 and 2.37). The findings suggest that while there is agreement on certain roles of industry, such as the essential nature of industry-led initiatives and the importance of industry-community partnerships, there is notable disagreement on the significant contributions of industry partnerships, the impact of industry investments, the effectiveness of industry-academia collaboration, the role of industries in funding projects, and the provision of necessary resources and expertise. This indicates a perceived gap between the potential role of industry and its current impact on enhancing educational infrastructure for sustainable development in Rivers West senatorial district.

Research Questions 3: What is the role of government in enhancing educational infrastructure for sustainable development in Rivers West senatorial district?

Table 3: Summary of mean scores on role of government in enhancing educational infrastructure for sustainable development in Rivers West senatorial district

S/No	Role of government in enhancing educational infrastructure for sustainable development.	JSS $\overline{X}$	SD	Decision	SSS $\overline{X}$	SD	Decision
15	Government initiatives significantly contribute to the development of educational infrastructure in Rivers West senatorial district.	2.70	0.61	Agreed	2.80	0.51	Agreed
16	Government funding has a positive impact on the quality of educational facilities in the region.	2.50	0.71	Agreed	2.75	0.62	Agreed
17	Collaboration between government and academia enhances sustainable development of educational infrastructure.	2.54	0.71	Agreed	2.65	0.73	Agreed
18	Government policies are crucial in supporting projects that	2.50	0.76		2.50	0.44	

	improve educational infrastructure in Rivers West.			Agreed			Agreed
19	Government-led initiatives are essential for the sustainable development of educational infrastructure.	2.79	0.50	Agreed	2.95	0.22	Agreed
20	Government in Rivers West senatorial district prioritizes sustainable practices in their infrastructural development plans.	2.58	0.75	Agreed	2.65	0.73	Agreed
21	Government initiatives significantly contribute to the development of educational infrastructure in Rivers West senatorial district.	2.54	0.76	Agreed	2.50	0.84	Agreed
	Average Mean/SD	**2.59**	**0.38**		**2.68**	**0.67**	

Table 3 presents a summary of mean scores and standard deviations (SD) on the role of government in enhancing educational infrastructure for sustainable development in Rivers West senatorial district, comparing the views of Junior Secondary School (JSS) and Senior Secondary School (SSS) respondents. The overall perception from both JSS and SSS respondents indicates agreement on the role of government in enhancing educational infrastructure for sustainable development, as reflected by the average mean scores (2.59 and 2.68). The findings indicate a strong consensus among both JSS and SSS respondents that the government plays a significant role in enhancing educational infrastructure for sustainable development in Rivers West senatorial district. The agreement spans across various aspects, including government initiatives, funding, and collaboration with academia, policy support, and prioritization of sustainable practices. This suggests a positive perception of the government's efforts and its crucial role in driving sustainable development in educational infrastructure.

Hypotheses

H_{01}: There is no significant difference in the mean scores of Junior and secondary respondents on the role of academia in enhancing educational infrastructure for sustainable development in Rivers West senatorial district.

Table 4: Z-test Scores on the role of academia in enhancing educational infrastructure for sustainable development in Rivers West senatorial district

Respondents	$\bar{X}$	SD	N	Df	Z-cal	Z-crit	Decision
JSS	2.45	0.68	80				
				158	0.4	1.96	
SSS	2.49	0.58	80				

We fail to reject the null hypothesis since Z-cal 0.4 is less than Z-crit; 1.96 in Table 4. Therefore, there is no significant difference in the mean scores of Junior Secondary School (JSS) and Senior Secondary School (SSS) respondents on the role of academia in enhancing educational infrastructure for sustainable development in Rivers West senatorial district. This indicates that both groups have similar perceptions regarding the role of academia in this context.

H$_{02}$: There is no significant difference in the mean scores of Junior and secondary respondents on industry in enhancing educational infrastructure for sustainable development in Rivers West senatorial district.

Table 5: Z-test Scores on the role of industry in enhancing educational infrastructure for sustainable development in Rivers West senatorial district

Respondents	$\bar{X}$	SD	N	Df	Z-cal	Z-crit	Decision
JSS	2.32	0.71	80				
				158	0.49	1.96	
SSS	2.37	0.58	80				

We fail to reject the null hypothesis since Z-cal 0.49 is less than Z-crit; 1.96 in Table 5. Therefore, is no significant difference in the mean scores of Junior Secondary School (JSS) and Senior Secondary School (SSS) respondents on the role of industry in enhancing educational infrastructure for sustainable development in Rivers West senatorial district. This indicates that both groups have similar perceptions regarding the role of industry in this context.

H$_{03}$: There is no significant difference in the mean scores of Junior and secondary respondents on role of government in enhancing educational infrastructure for sustainable development in Rivers West senatorial district.

Table 6: Z-test Scores on the role of government in enhancing educational infrastructure for sustainable development in Rivers West senatorial district

Respondents	$\bar{X}$	SD	N	Df	Z-cal	Z-crit	Decision
JSS	2.59	0.68	80				
				158	0.84	1.96	
SSS	2.68	0.67	80				

We fail to reject the null hypothesis since Z-cal 0.84 is less than Z-crit; 1.96 in Table 6. Therefore, is no significant difference in the mean scores of Junior Secondary School (JSS) and Senior Secondary School (SSS) respondents on the role of government in enhancing educational infrastructure for sustainable development in Rivers West senatorial district. This indicates that both groups have similar perceptions regarding the role of government in this context.

Discussion of Findings

The role of academia, industry, and government in enhancing educational infrastructure for sustainable development is pivotal and multifaceted. Empirical studies provide substantial evidence on how these sectors contribute to educational advancement.

Academia's impact on educational infrastructure and sustainable development is well-documented through various research and innovation initiatives. For instance, Nigerian universities' development of e-learning platforms has significantly improved educational access in remote areas, highlighting the transformative potential of academic research (Okojie, 2021). Additionally, specialized training programs in universities help build the capacity of educators and administrators. The introduction of these programs in Bayelsa State has equipped educational professionals with the skills needed to maintain and enhance infrastructure (Ebiere, 2023). Another study emphasized the impact of community engagement projects led by universities in Rivers State, which have successfully upgraded local school facilities (Nduka, 2022). Furthermore, a study by Bassey et al. (2018) demonstrated how Nigerian universities have incorporated sustainability into their campus operations, influencing broader infrastructural improvements (Bassey, Esirah, & Isaac, 2018).

Industries play a crucial role in supporting educational infrastructure through funding, technological innovations, and aligning educational outcomes with market needs. Local industries in Rivers State have invested in university laboratories, enhancing research capabilities (Nduka, 2022). Additionally, partnerships with tech companies have led to the development of advanced educational technologies, significantly improving access to quality education (Okojie, 2021). A study by Adejumo and Alade (2019) illustrated how industry partnerships in Nigeria have facilitated the construction of modern educational facilities, thus enhancing the learning environment (Adejumo & Alade, 2019). In Edo State, collaborations between local businesses and educational institutions have established vocational training centers, which have been crucial in boosting employment and supporting economic growth

(Osagie, 2024). Moreover, research by Akinwale (2020) showed how industry-funded projects have led to the integration of renewable energy solutions in school infrastructures, promoting sustainability (Akinwale, 2020).

Government intervention is essential for developing and maintaining educational infrastructure through policy formulation, funding, and regulatory oversight. The Bayelsa State government's policies promoting renewable energy in schools have set a precedent for sustainable infrastructure (Ebiere, 2023). Government funding has been critical in constructing and maintaining educational facilities, ensuring access to quality education, especially in underserved areas (Okojie, 2021). Regulatory bodies established by the Nigerian government ensure that educational infrastructures meet national standards for safety and quality (Nduka, 2022). A study by Obasi and Ekwueme (2016) highlighted how government policies have facilitated the development of ICT infrastructure in schools, enhancing digital learning (Obasi & Ekwueme, 2016). Additionally, research by Onuoha (2022) emphasized the role of government grants in supporting infrastructure projects in rural schools, thereby reducing educational disparities (Onuoha, 2022). Another example is the Nigerian government's National Policy on Education, which has been instrumental in driving infrastructural development across educational institutions nationwide (Federal Ministry of Education, 2018).

Conclusion

This study examined the roles of academia, industry, and government in enhancing educational infrastructure for sustainable development in Rivers West senatorial district. The findings reveal a general agreement on the role of government in improving educational infrastructure, with respondents from both Junior and Senior Secondary Schools acknowledging the government's significant contributions. However, there is notable disagreement on the roles of academia and industry, indicating perceived gaps between their potential and actual impacts. Despite similar perceptions across educational levels regarding academia and industry, the role of government is more positively recognized.

Recommendations

Based on the findings of this study the following recommendations were made;

1. To bridge the gaps identified in the roles of academia and industry, there should be increased collaboration between these sectors and educational institutions in Rivers west senatorial district.

2. Industries should be encouraged to increase their investments in educational infrastructure, including funding modern facilities and providing technological resources in Rivers west senatorial district.

3. The local governments should continue to prioritize sustainable practices in educational infrastructure development Rivers west senatorial district.

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Application of Artificial Intelligence (AI) in Education and Educational Assessment

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Abstract

This paper examined the application of artificial intelligence (AI) in education and educational assessment. The delivery of education goods is mostly centered around evaluation and assessment of students work as well as teachers and school administrators service delivery in the school system which has warranted this conceptual overview on the subject matter. The paper started with a critical conceptual overview of the major concepts being artificial intelligence and educational assessment. This paper promptly overviewed some of the types of educational assessment as well as the advantages and disadvantages of educational assessment. Also reviewed in this paper were the purposes of educational assessment as well as artificial intelligence in educational assessment, the paper also viewed some artificial intelligence tools. The paper concluded with the suggestion that, the application of artificial intelligence in educational assessment should be encouraged by the government and educational managers to engender academic development.

Introduction

The value of education in every society stands taller than any other sector across the globe, this is because, the excellence of other sectors solely depends on the education sector, this is why it is widely said, "no nation can grow above its education sector". This is why the overall development of education is of great and general concern to education stakeholders, in the respect, frantic efforts have been made by the stakeholders to rescue education from imminent collapse, one of such efforts is the integration of artificial intelligence into educational practices generally which to some extent have made tremendous impacts towards the development of education in that regards. Artificial intelligence is viewed across multiple sectors, particularly, in the area of educational development, the writer is mostly concerned with the application of artificial intelligence in education and educational assessment.

The paper poised is to review credible literatures on artificial intelligence and educational assessment, relevant literatures on the subject matter as it relates to the major and minor variables were reviewed, prominent among them were some examples of artificial intelligence technology as well as some advantages and disadvantages of AI.

In the area of educational assessment, some of the types of educational assessment, purpose of educational assessment as well as the nexus and exploits of the integration of artificial intelligence and educational assessment form the major highlights of this paper, and was closely followed by conclusion and suggestions.

Conceptual Overview of Artificial Intelligence (AI)

The exigencies and complexities of human existence have necessitated humans to devise several credible and acceptable means of making life more meaningful which has heralded the array of challenges human beings go through on a daily basis. However, as a higher animal, humans are expected to navigate their way through any stringent situation using experience, sharpness and foresightedness which are all attributes on intelligence. Therefore, intelligence is the ability to learn, understand and apply such knowledge to manipulate one's environment to his or her advantage (Marriam Webster 2022). Consequently, Robinson and Davidson, (2006) describe intelligence as the ability of someone to show a highly developed experience gathering, knowledge acquisitions, cognate understanding of issues, reasoning, imagination and sense of judgment that is capable of unbiased delivery of dispute resolution mechanism.

On the strength of the above and in line with growing global demand for productivity enhancement, hence the need to create something unnatural that has the ability to imitate humans in all aspects of human endeavor, not as a replacement of humans but as an assistant and support giver to human efforts. This is said of artificial human creations that are capable of standing in for humans in case of tiredness, fatigue and most importantly, for optimal output. The phrase artificial intelligence is a combination of two words namely: "artificial and intelligence" whose conceptual overview have been explained earlier.

It is widely considered to be the smartness or cleverness of humans to catalyze or bring to existence certain devices and softwares that can help or assist human efforts, such devices like motor, computer, electronics, telephones are human creations that are not humans but helps to make life easy and bearable for human beings. Thus, Nwankwo (2007) defined artificial intelligence as the development of human friendly devices and effective usage of such devices like computer systems, telephones, software etc that performs and or executes such functions

usually performed by human beings using smart and intelligence approach. In a related development, Mariam Webster Dictionary sees artificial intelligence as ability of machine(s) to imitate intelligent human behavior. The emphasis according to the positions of the above authors on artificial intelligence explains the invention of a device or some devices that are sensitive enough to complement human efforts intelligently.

An historical perspective of artificial intelligence was drawn to mean an animated object endowed with intelligence existed since the ancient times and was used by the Greek god Hephaestus, the animated objects was like a robot whose duty at the time was to serve the Greek God. The trend continued until the late 19th century up to the early 20th century when computer emerged in 1836 by the Cambridge university mathematician, Charles Babbage and Augusta Ada King. This gave rise to several versions of computer productions till date (Burns 2023). In specific terms, Burns identified artificial intelligence as the stimulation of human intelligence processes by machines such as computers. Premised on the above, the author mentioned some examples of artificial intelligence technology as,

    i. Automation

    ii. Machine learning

    iii. Machine version

    iv. Natural Language Processing

    v. Robotics (vi) Self driving cars

    vi. Text, image and

    vii. Language audio generation.

It was also advanced that artificial intelligence is important because it has the potentials to change our general lifestyle, work life and play life because it is used to automate tasks done by humans. Also identified where some of the advantages of artificial intelligence which included,

a) Good and detailed oriented jobs

b) Reduced time for data heavy task

c) Saves labour and increases productivity

d) Delivers consistent results

e) It improves customer satisfaction through personalization

f) AI powered agent are always available.

While some of the disadvantage of AI include,

a) Expensive

b) It requires deep technical expertise

c) Limited supply of qualified workers to build AI tools

d) Reflect the biases of its training data

e) Lack of ability to generalize from one task to another

f) Eliminates human jobs, increasing unemployment rate.

Concept of Educational Assessment

The term educational assessment is a terminology commonly used in the education profession to evaluate and analyses the performance of both students, academic and non-academics staff in the school systems. It is a systematic process of documenting and using empirical data to estimate or ascertain the performance level of individuals in the school systems. Pigott and polanin (2020) asserts that, educational assessments can be seen as any effort to gather systematic evidence that will enhance the attainment of learning goals and objectives, either at the level of individual student or at the level of larger organization. The definition above on educational assessment insist that, every organization, including the schools have their primary goals and objectives to achieve within a stipulated time fame, here, the need for assessment becomes imminent in other to ascertain that, educational goals are achieved.

In most of the cases, whenever educational assessment is mentioned, what runs through the mind of most person's is either assessment through examinations or test. However, assessment is far from just test, and examinations, it is a holistic approach that involves the documentation of knowledge, skills, attitudes and beliefs that can be measured. Against this background, Mishra, (2022) opined that, educational assessment is the process of gathering information about what students have learned in their educational environments. Mishra further asserts that, educational assessments is an ongoing process, ranging from the activities that teachers undertake with students in class every day to standardized testing, collage theses and instrument that measure the success of collage training programmes. Further understanding of the conceptual overview of educational assessments is hinged on the facts that, educational assessments is not based in exams and test alone, it involves all the activities of the teacher both within and outside the classroom as long as teachers and students are involved. Educational assessments also involves a careful and systematic gathering of necessary data about all that

the students have learned in their educational environment, with a view of making an informed judgment that is capable of suggesting a particular area or direction that requires improvement.

Types of Educational Assessment

Nevertheless, engaging in a review of this sort without identifying some of the types of educational assessments may render the work incomplete, on this premise, Formplus, (2023), have identified about nine types of educational assessments which includes:

1. Alternative assessments
2. Authentic assessments
3. Summative assessment
4. Formative assessment
5. High stakes assessments
6. Pre-assessments
7. Performance assessment
8. Portfolio based assessment
9. Diagnotic assessments

Alternative Assessments

This type of assessments involves evaluating student's ability based on their newly acquired skills to execute task or handle educational problems. It is different from the traditional assessments methods because it is programed to handle individual student's needs. Alternative assessments methods enable the instructor to have a complete insight of the students' level of assimilation because of the complex task given to them by the teacher. This type of assessments encourages deeper learning and understanding, it develops deeper thinking and problem-solving skills, foster creativity and innovation and also reduce test anxiety and stress.

Authentic Evaluation

The authentic assessments method is geared towards training students to use their acquired skills from the school to solve real life situations. This further explains, just like every human being, students also face some real-life challenges, however, the authentic assessments model is aimed at training students with the right aptitude that is capable of sowing real-life tasks, requiring students to apply their knowledge, skills and critical thinking abilities and complete tasks that are relevant and meaningful outside the classroom. Authentic assessments prepare students for challenges outside the class, develops them to acquire critical thinking, problem

solving and collaborative skills, increase student's engagement and innovative skills, encourage deeper understanding and application of knowledge.

By using authentic assessments methods, educational instructors can create better learning experiences that could be more useful and engaging, which could also serve as effective tools for preparing students for success in their future endeavors both within and outside the classroom.

Diagnostics Assessment

As posited by Education Advice, (2024) and Miles (2022), diagnostic assessment is that assessments that takes place before any learning activity takes place. This assessment informs the teacher of their previous knowledge of the learner and prepares and equips him for any challenge ahead. This is done by presenting a set of written or oral questions to the students that are capable of eliciting responses from the student's education, Advice identified some of the tools for this kind of assessment, they include, journals, quiz, tests, conference, interview, posters, performance tasks, students survey etc. it helps to identify student's strength, opportunities, weakness, treats, knowledge gaps and learning needs. It is used to determine students' prior knowledge, inform the instruction gaps and monitor progress.

Diagnostics instructions is relevant because it's aims to tailor instructions to meet individuals needs and set realistic goals targets, it is also aimed at developing targeted instructions, interventions and supports that will enhance the monitoring of students, progress and adjust instructions that is capable of enhancing students learning outcomes.

Formative Assessment

Students learning and instructions cannot be complete without formative assessment, it is the kind of assessment that takes place while the process of teaching and learning is taking place. During this process, questions are asked by both the teacher and the learners and answers are given to the questions asked, informing them of areas of lack and requires better attention, the teacher advances further to apply techniques in his assessments model in other to get the best out of the students. This type of assessments also monitors students' progress, identify areas of improvement, inform instruction as well as enable teachers to adjust teaching strategies and methods.

The use of formative assessment enables teachers to refine their teaching strategies, provide timely feedback and support, encourage student reflection, assessments as well as infuse growth mindset and continuous learning attitude.

Some of the identified examples of formative assessment include, students peer conference or one on one meeting within themselves and with their teacher, class discussion, impromptu test, assignments, observation and correction of students behavior etc.

Summative Assessments

As the names implies, summative assessments is the evaluation of the sum total of learning outcomes of students and their academic accomplishments at the end of a particular educational programme, summative assessment happens after learning activity, at this point, the teacher sums up all the assessments that have occurred within a giving period. It also evaluates students' performance, measure student's achievement, determines students grades and levels as well as certify mastery. Other areas of concern are, summative assessment determines student's readiness or advancement identify areas for curriculum improvement, provide accountability and transparency and encourage competence in students

Ipsative assessment

Another notable assessment is the ipsative assessment, the functionality of the ipsative assessment is the comparison of one's previous results, the essence of which serve as a great motivator to enable one to try harder in order to do better than one's previous attempts, this will make students set goals and targets for themselves that is aimed at improving their intellect and skills. It also helps student learn from their previous mistakes which encourages them to do better. It measures progress, growth and improvement over time. This type of assessment is mostly exemplified by i, personal learning plans, ii, self-assessment iii, rubrics learning journal, iv, progress portfolios, v, individual goals setting.

Confirmative assessment

The name confirmative means re-examining a particular process or training in order to determine if its efficiency is capable of meeting up expectations to a large extent, it is an advanced summative assessment. This type of assessment seeks to know if students' performance has improved or not, as it relates to students acquiring the expected knowledge and skills.

Specifically, confirmative assessment is used to verify learning outcomes, certify competence, accountability and programme evaluation, some of the areas where confirmative assessment are mostly used are examination results and tests and assessments, seminar presentations, practical, projects, theses and dissertations, professional certifications etc. The objective of the confirmative assessment is to confirm if students have met the expected standards/outcomes or not.

Self-Assessment

This type of assessment enhances the students to self-evaluate themselves with a view of assessing their abilities, capabilities, strengths and weaknesses and consequently making efforts to improve on the identified weakness to enable them accomplish their academic goals successfully.

Self-assessment involves goal setting for oneself and establishing personal objectives and targets, encouraging self-directed learning and taking ownership of learning, improved self-awareness and being conscious of your environment and peculiarities, reflection on previous studies as well as self-evaluation of past questionnaires etc. this approach of self-assessment enables the student to take control and be in charge of their studies, giving them the opportunities to easily identify their areas of weakness and improving on them swiftly (Smowltech, 2024).

Purpose of Educational Assessment

As a process of evaluating the progress made by students during and within the period of their learning while in school, and achievements made in the educational setting, educational assessment has a number of purposes which include:

 i. To provide evidence and confirmation of programme outcomes

 ii. To identify learner engagement that delivery is hitting the marks, highlight potential issues and mitigate the risk of disengagement.

 iii. To identify baseline skills and the level of competencies across these learners, gain can be measured.

 iv. To ensure applicants can accommodate programme demands (FutureLearn, nd).

Dappa, (2018) opined that, some of the purposes of assessment are:

 a. Assessment to improves learning: Learning outcomes are being improved because there is assessment and evaluation that always reveals performance of students

to them, giving them the opportunity and space to put in more effort to improve on their previous learning outcomes.

b.   Informing instructions: Assessment of students work and performance informs teachers of the next discussion they are to take in the areas of teaching. It guides instructors on when and how to adjust the curriculum as well as how to improve on their instruction pattern.

c.   Students placement and promotion: The only and surest means of determining students' performance that guarantees their placement to the next level is assessment. It set up criteria and grading modalities as well as standards set for upgrading, placement and promotion and all these processes are made possible through assessment.

d.   Enhancing student's motivation: the very outcomes of assessment are heavy source of motivations to students. This is so because, when students see their performance after assessment and saw that it was good, it spurs them to do more in order to improve on the present standard. Similarly, promotion and placement of students is a huge source of motivation which results in self-directed and informed learning.

e.   Supporting student's self-assessment: This is another important purpose of assessment, it is to enable students develop the ability to assess their performance by themselves through self-reflection, this enhances personal growth.

f.   Certification and accountability: Assessment confirms the student's competencies and subsequent recommendations for a deserving placement which is being represented by certification which serves as statement of accountability and a testimonial that will speak for the students in their absence.

g. Identifying areas for improvement: Assessment is directly purposed to identifying areas of improvement, it is like a fact-finding mission, and assessment identifies certain areas of improvement like identifying knowledge gap, skill deficiencies areas needing additional support and so on. All these are areas that assessment seeks to improve.

h.   Evaluate student's achievements: Students achievement is key to the educational system and one best way the educational system can evaluate student's achievement is through assessment. Through assessment in the school can measure students' progress, level of achievement and mastery of learning objectives

Artificial Intelligence in educational assessment

The introduction of artificial intelligence (Ai) into the school system is a credible intervention towards educational development in the areas of assessment and pedagogical advancement, students and teachers have also benefitted immensely from this development. As argued by Bassy (2024), AI offers enormous benefits to students and teachers by facilitating personalized learning, with the aid of the introduction of artificial intelligence. Students can be able to personalize and customize their learning process, it has enabled students to learn on their own with little or no aid from the teacher, students can be able to use the internet system to source for any material of their choice that are capable of solving whatever problems they may wish to solve. Some of the artificial intelligence tools frequently used by students include but not limited to the following,

1. **Virtual assistants** that is a software programme that uses artificial intelligence to perform tasks, provide information and assists with various activities, it can perform a wide range of functions including schedule of appointments and calendar management, sending and receiving massages, emails, notifications etc, personalized videos, conference video and audio calls, setting reminders and alarms, translating languages as well as generating texts and materials. These are made possible through the effective use of Amazon Alexa, Google Assistance, Apple Siri, Microsoft Cortana, Facebook Portal etc.

2. **Content generation**, this is the process of creating and producing content like audio, text, images and videos using various AI tools, techniques and technologies to create contents writing where human writers create original content like blogs, posts, articles, websites copy etc. These are very important Ai tools usually used by students for educating and training themselves, it also enables them develop effective communication and public relation skills. It's constant usage increases efficacy and productivity, improve consistency, accuracy and quality as well as invoke data driven insights and effective decision-making ability.

3**. Image and video analysis** represents the process of extracting information, meaning and insights from visual data like images and videos which are transmitted through social media and online platforms. However, some of the benefits include, enhanced accuracy and precision. improved efficiency and productivity as well as better decision making and insights. Even though time and space may not allow the writer to mention all the numerous AI tools as new ones are developed on a daily and weekly basis, it is official that the application of artificial intelligence engenders instant feedbacks by answering nearly all the unanswered questions as well as improve efficiency in the assessment processes of students works. AI is used to create

tutorials and interactive visual assistant systems that can be used to answer questions, provide additional explanations and guide students in the real time learning process. AI also automate many time-consuming administrative tools in teaching and learning which are used in assessing, evaluating and grading students works, they also provide feedbacks and detects plagiarism. Artificial Intelligence algorithms are used to recognize patterns and evaluate students' responses in various subjects, this allow teachers to receive smart and comprehensive assessed information on students' performance that will enable the teachers swiftly intervene in the individual needs of the students and collectively so (Mahendra, 2023).

Another interesting fact about Artificial Intelligence and educational assessment is the fact that teachers easily adapt to the learning processes introduced by AI to access the students' performance by collecting and analyzing data about students' progress in schools and using the same method to work towards improving their performance.

Artificial Intelligence integration into the educational sector have no doubt revolutionaries the school system particularly in the domain educational assessment. As promptly noted by Huseyn, (2024), the generalized teaching of every student in the same pattern and style is becoming obsolete, therefore AI driven adaptive assessments are now enabling schools to adapt individualized students specific teaching to address the peculiar learning needs of every student by fostering a more engaging and effective learning journeys, as a result and in appraisal of the effectiveness of artificial intelligence in educational assessment, instructors have begun to see it as a pedagogical instrument rather than a replacement of pedagogy itself. AI in educational assessment is also seen as a tool to provide real time feedback and better understand their student's confidence and motivation.

Huseyn further asserts that, AI doesn't get tired in its application or frustrated no matter how long it takes for a teacher to use it or a student to understand its concept, it is available at whenever or wherever you want it or it is needed. AI is seeing to be facilitate and encouraging personalized learning pathways that cater for each students individual and specific requirement, thus, reshaping education assessment to provide more tailored and effective assessment methods for both students and teachers. It is also believed that the intervention artificial intelligence in educational assessment has great and immense potentials in the academic sector that are considered plausible, it not out of place to mention that, one major obstacle that will face AI is the incomplete or lack of digitalization of the learning and assessment process in school setting as well as digital literacy of educators and learners.

Some AI tools used for Educational Assessment

Writing any article on artificial intelligence in education and educational assessment requires some expositions on artificial intelligence tools used for assessments of students work as it concerns assignments, tests, seminars, exams etc. This gives rise to highlights on some of the AI assessment tools.

Amidst several views, Clickup, (2024) and Neendoor, S. (2024) revealed some of the AI tools used for educational assessment which include:

i.   **Gradescope**

As AI assessment tool, grade scope is specifically designed to streamline the grading process for instructors and provide valuable feedbacks for students on where they did well and where they didn't do well and needs corrections. Grade scope assessment tool tries to improve the grading system for instructors to enable them improve their assessment methods and patterns and key into modern and trending assessment models which will enhance efficacy in the business of assessment and engender faster grading in students' tests, assignments, examinations, seminars etc.

ii. **Huric digital**

Huric digital is a pioneer digital assessment tool that provides a robust online monitoring   and evaluation tor teachers. This assessment tool is mostly used by most education providers. The platform provides quality AI grading system, online assessment creation and delivery for educators and trainers, this AI tool can also be used to develop custom test on the platform.

iii. **Turnittn**

Turnitin is a special educational assessment soft were developed to detect plagiarism in the educational system, it is often used by educators and higher graduate students to prevent and control academic fraud. Again, Turnitin assessment tool is also good in the areas of accessing features like PeerMark, Rubrics and Feedback studio that enhances classical assessment approaches.

iv. **Question mark**

This assessment tool is mostly used by organizations to create, deliver and analyse online assessment. It also powered AI assessment offer options for item banking, test delivery and outcome evaluation. Teachers can use these predictive analytics to

identify areas that need corrections to enable them effect such corrections on time and with precision.

v. Gradescope

Gradescope is one of the known assessment tools that allows teachers to grade assignments, tests, exams and projects with customizable rubrics, it uses AI to read handwriting, spot patterns and deliver immediate feedbacks. This assessment tool is highly advanced, its features ensure quick grading and assessment uniformity.

Conclusion

Assessment is a process of properly determining or ascertaining quality and real value of something, when narrowed down to the educational sector, it is seen as the valuation or evaluation of students work in other to grade their performance and make recommendations for improvements where necessary, this process have made several inroads over time and has advanced optimal and meaningful progress in the education sector through improved students' performance.

Suggestions

The integration of artificial intelligence in educational assessment have brought about significant breakthrough in the education sector across the globe in the areas of student's content and students' performance, teachers teaching and assessment skills have also recorded significant improvement. It is therefore of the view of the author that, the application of artificial intelligence in educational assessment should be encouraged by the government and educational managers to engender academic development.

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Inclusive Education for Sustainable Development in Public Universities in Rivers State

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Abstract

This paper examines Inclusive Education for Sustainable Development in Public Universities in Rivers State. Four objective and four research questions and four hypotheses were posed to guide the study. The population for the study consists of 313 lecturers and final year students in Department of Educational Management, Rivers State University. The sample size consists of the entire population of 313 lecturers and final year students. Census sampling techniques was adopted. Data for the study were collected by means of questionnaire titled Inclusive Education for Sustainable Development questionnaire (IESDQ)'. The instrument adopted a four-point rating scale of High Extent to Very low Extent. Test-re-test method was used for the reliability test which yielded reliability co-efficient of 0.92. 313 Copies of questionnaire were distributed, and Three hundred and thirteen (313) were retrieved for analysis. Mean and Standard Deviation were used to answer the research questions, while t-test was used to test the hypotheses. The findings revealed that Accessibility is fundamental for creating an inclusive educational environment. Based on the findings, conclusion was drawn that tertiary institutions can create a more inclusive educational environment that supports sustainable development and ensures that all students have the opportunity to thrive. It was recommends made amongst others that Ministry of Education should constantly organise training and retraining of lecturers on inclusive education pedagogical skills and handling of diversified learners in the same classroom. Design curricula with flexible learning pathways and adaptive assessments to accommodate different learning styles and abilities, promoting equitable access to educational resources.

Keywords: Accessibility, Curriculum design, Teaching and learning method and Support service

Introduction

Education is important in the society because it contains a curriculum that helps in the development of a child's skill either physically, character-wise, intellectually and also inculcates discipline and helps in the upbringing of a child (Fafunwa, 2004). Education has been viewed as the best tool that can be acquired to realize desirable changes. Ering, and Ajake (2012 p. 178) defined education as a basic tool for achieving development at all levels. They argued that "education is the process of acquiring new values and skills for the purpose

of effective functioning in the society". Adeyanju (2010) stated that development cannot take place in human society without education, and conversely, no lasting peace and security can be accomplished without development (cited in Anaduaka & Okafor, 2013, p. 152). This is to imply that for development to occur in a society; both individuals and the state should have access to quality education. Education, therefore, becomes the indices for measuring the development capacity of both the individuals and state (Daura & Audu, 2015, p. 72). Inclusive education for sustainable development in tertiary institutions have several variables that are critical to its successful implementation and effectiveness, but four variables were used, accessibility, curriculum design, teaching and learning methods support services.

Accessibility encompasses the physical, digital, and socio-economic access to education for all students, including those with disabilities, from marginalized communities, or with financial constraints. It includes ensuring that campus infrastructure is accessible, providing financial aid or scholarships, and offering online resources and assistive technologies. An inclusive curriculum design involves integrating content that reflects diverse perspectives, cultures, and experiences. It also means creating flexible curricula that accommodate different learning styles and needs, ensuring that all students can engage with the material and achieve their academic potential. Teaching and Learning Methods focuses on the pedagogical approaches used by educators to facilitate inclusive education. It includes adopting student-centered teaching methods, differentiated instruction, and the use of universal design for learning (UDL) principles to ensure that all students, regardless of their background or abilities, can participate and succeed in their studies. The availability and effectiveness of support services, such as counseling, academic advising, disability services, and peer mentoring, are crucial variables. These services help students overcome personal, academic, or social barriers, enabling them to fully engage in their education.

Inclusive education is not just a human right but also a powerful catalyst for sustainable development. Inclusive education is a vital component of sustainable development, as it ensures that all individuals, regardless of their socio-economic status, gender, disability, or ethnicity, have access to quality education. The concept of inclusive education goes beyond merely providing access; it focuses on creating an educational environment that accommodates the diverse needs of all students, promoting equity and social justice. According to UNESCO (2020), inclusive education is crucial for achieving the Sustainable Development Goals (SDGs), particularly SDG 4, which aims to ensure inclusive and equitable quality education for all.

Inclusive Education" came into limelight after the World Conference on Special Needs Education that took place in Salamanca, Spain in 1994. The Salamanca Statement asserts that: "Every child has unique characteristics, interests, abilities and learning needs, and those with special educational needs must have access to regular schools which should accommodate them within a child-centred pedagogy capable of meeting their needs" (UNESCO, 1994, p.8). After the Salamanca Declaration, most countries including Nigeria, have acknowledged that inclusive education is an important premise to redress all forms of exclusion, marginalization, disparities, inequalities and access to educational opportunities. Ajuwon (2012) argued that inclusive education is important to the development of Nigeria. This is because it enhances the education system in Nigeria which extends to different sectors of the economy. He further stressed that the primary reason for inclusion is the benefit that special students gain and experience they get in a regular school which includes education with peers without disability. However, some inclusionists are of the view that separate classrooms should be allocated only when a child impairment or disability is severe and the use of regular class for that child cannot be accomplished.

Inclusive education entails when all children, irrespective of their diversities, abilities, disabilities or any challenges they may have, are placed in the same general education classroom to learn together with their peers. UNESCO (2015) emphasized that inclusion is aimed at ensuring that all learners have access to quality education that meets their basic learning needs in a manner that there is no discrimination or exclusion within or outside the school system. Ajuwon (2012) defined inclusive education as a process of enhancing the capacity of the education system to reach out to diverse learners. Hence, the diverse learners have the right to be taught in the same classroom in a mainstream school; instead of excluding some to learn in a special school except in severe cases. Shyman (2015) also defined inclusive education in the perspective of social justice by asserting that all individuals, regardless of exceptionality, are entitled to the opportunity to be included in regular classroom environments. Mundy (2016) noted that special schools have been found to be socially dysfunctional and irrelevant to the total well-being of persons with disabilities as they help reinforce negative social practices such as discrimination, segregation, low self-esteem and denial of the fundamental rights of children with disabilities.

Inclusive education requires a shift in educational policies and practices to address the barriers that prevent marginalized groups from accessing education. This includes modifying curricula, teaching methods, and learning environments to cater to diverse learning needs. Research by

Ainscow (2021) emphasizes that inclusive education fosters a sense of belonging among students, which is essential for their overall development and well-being. Additionally, it promotes social cohesion by encouraging interactions between students from different backgrounds, thereby reducing inequalities and fostering mutual understanding.

The role of inclusive education in sustainable development extends beyond the classroom. It equips individuals with the knowledge, skills, and values necessary to contribute to the economic, social, and environmental dimensions of sustainable development. For instance, students who receive an inclusive education are more likely to engage in sustainable practices and advocate for the rights of others, contributing to a more just and equitable society. As noted by Kiuppis (2022), inclusive education lays the foundation for lifelong learning and active citizenship, both of which are critical for sustainable development. This paper tries to shed more light on the Inclusive Education for Sustainable Development with references to lecturers and final year students in department of educational management, Rivers State University

Accessibility is fundamental for creating an inclusive educational environment. This includes ensuring that campus facilities are physically accessible to students with disabilities, providing digital accessibility through compatible online learning platforms, and offering financial support to reduce socio-economic barriers. Ensuring that all students can access learning resources, participate in activities, and benefit from institutional services is essential for fostering an inclusive atmosphere where everyone has equal opportunities to succeed. An inclusive curriculum design integrates diverse perspectives and learning needs into the academic content and structure. It involves creating course materials that reflect a variety of cultural, social, and experiential backgrounds. Additionally, it requires designing flexible and adaptable curricula that accommodate different learning styles and abilities. By embedding inclusivity into the curriculum, institutions can ensure that all students engage with relevant and accessible content, which supports their learning and development.

The choice of teaching and learning methods significantly impacts the inclusivity of the educational experience. Employing student-centered approaches, such as differentiated instruction and universal design for learning (UDL), allows educators to address diverse learning needs effectively. This involves using various instructional strategies and tools to cater to different learning preferences and abilities, thereby ensuring that all students can engage with the material and achieve their academic goals.

Providing comprehensive support services is crucial for helping students overcome various barriers to their education. These services include academic advising, counseling, disability support, and peer mentoring. By offering targeted assistance and resources, institutions can help students navigate challenges, enhance their academic performance, and foster a supportive learning environment. Effective support services contribute to an inclusive educational experience by addressing individual needs and promoting student well-being. By focusing on these four variables, tertiary institutions can create a more inclusive educational environment that supports sustainable development and ensures that all students have the opportunity to thrive. Addressing accessibility, designing inclusive curricula, employing effective teaching methods, and providing robust support services are essential steps in fostering an equitable and sustainable educational experience.

Statement of Problem

Inclusive education, recognized as a fundamental human right and a cornerstone of sustainable development, embodies the principles of equity, social justice, and respect for diversity. The United Nations Sustainable Development Goals (SDGs) acknowledge the importance of inclusive education in achieving sustainable development by promoting lifelong learning opportunities, fostering social cohesion, and empowering marginalized groups. More worrisome is the fact that inclusive education seems to have become rhetorics. Different policies and legal frameworks have been formulated on inclusive education and its guidelines, but the implementation seems to be a Herculean task. A glance at the education system shows that attaining inclusive education is a far cry in Education system. The infrastructures that will accommodate students with special needs and diversities are inadequate let alone being accessible.

Despite the critical role of inclusive education in promoting sustainable development, several challenges hinder its effective implementation in tertiary institutions, particularly in the areas of curriculum design, teaching and learning methods, and support services. One significant problem is the lack of a universally inclusive curriculum design that adequately reflects diverse cultural, social, and experiential perspectives. Many curricula remain rigid and standardized, failing to accommodate the varied learning needs of students, especially those from marginalized groups. This lack of flexibility in curriculum design limits students' ability to engage fully with the educational material, thereby hindering their academic success and overall development.

The teaching and learning methods employed in many tertiary institutions are often not sufficiently inclusive. Educators may lack the training or resources to implement differentiated instruction and universal design for learning (UDL) principles, which are essential for addressing the diverse needs of students. The support services available to students, such as counseling, academic advising, and disability services, are often underdeveloped or inaccessible to those who need them most. This lack of comprehensive support exacerbates the challenges faced by students from disadvantaged backgrounds, preventing them from fully benefiting from their educational experience and contributing to sustainable development.

Purpose of the Study

The main aim of this study is to determine Inclusive Education for Sustainable Development in Public Universities in Rivers State. Specifically, the study seek to:

1. Determine the extent to which Digital Accessibility improve sustainable development in Public Universities in Rivers State.

2. Ascertain the extent to which Teaching and Learning Methods improve sustainable development in Public Universities in Rivers State

3. Examine the extent Curriculum Design improve sustainable development in Public Universities in Rivers State

4. Establishing the extent support service improve sustainable development in Public Universities in Rivers State

Research Questions

The following research questions are posed to guide the study:

1. To what extent does Digital Accessibility improve sustainable development in Public Universities in Rivers State?

2. To what extent does Teaching and Learning Methods improve sustainable development in Public Universities in Rivers State?

3. To what extent do Curriculum Design improve sustainable development in Public Universities in Rivers State?

4. To what extent does support service improve sustainable development in Public Universities in Rivers State?

Hypotheses

The following hypotheses are formulated and were tested at 0.05 level of significance:

1.   There is no significant difference in the mean ratings of lecturers and students on the extent to which Digital Accessibility improve sustainable development in Public Universities in Rivers State.

2.   There is no significant difference in the mean ratings of lecturers and students on the extent to which Teaching and Learning Methods improve sustainable development in Public Universities in Rivers State.

3.   There is no significant difference in the mean ratings of lecturers and students on the extent to which Curriculum Design improve sustainable development in Public Universities in Rivers State.

4.   There is no significant difference in the mean ratings of lecturers and students on the extent to which Support services improve sustainable development in Public Universities in Rivers State.

Methodology

The study adopted a descriptive survey research design. The population of the study is made up of (313) lecturers and the final year educational management student, in Rivers State University. This study adopted the census sampling technique. The sample size consists of the entire population of (313) lecturers and final year educational management student. 15 lecturers and 298 final year educational management students. The instrument titled Inclusive Education for Sustainable Development questionnaire (IESD) is 4 point likert structured rating scale which was validated for content and face validity by 3 experts, one from the department of Educational management, Two from Measurement and Evaluation. The questionnaire recorded a reliability coefficient of 0.92 was administered face to face to the 313 respondents by the researchers who also retrieved same. The data collected were analyzed with mean and standard deviation and the null hypotheses were tested using the t-test statistics at 0.05 level of significance.

Result

Research Question 1: To what extent does Accessibility improve Sustainable Development in Rivers State University

Table 1:   Mean and Standard Deviation on the Extent Accessibility improve Sustainable Development in Public Universities in Rivers State

	Students = 298	Lecturer = 15	**Mean set**	**Remarks**

s/n	Item statement	$\overline{x}_1$	SD_1	$\overline{x}_2$	SD_2	$\dfrac{\overline{x}_1 + \overline{x}_2}{2}$	
1	Improving accessibility to educational resources for students with disabilities contributes to sustainable development goals	3.13	0.97	2.93	1.06	**3.03**	High Extent
2	Providing accessible digital learning platforms enhance the educational experience and support sustainable development	2.20	0.95	2.53	1.09	**2.36**	Low Extent
3	enhancing accessibility to extracurricular activities (e.g., clubs, sports) promotes a more inclusive and sustainable campus community	3.51	0.82	3.33	0.94	**3.42**	High Extent
4	Accessibility in promoting equal opportunities for all students in achieving sustainable development within our academic programs	3.00	1.04	3.40	0.95	**3.2**	High Extent
5	Accessibility improvements in our institution's infrastructure and services align with sustainable development principles?	2.95	1.11	2.80	1.05	**2.87**	Moderate extent
	Total	**14.79**	**4.89**	**14.99**	**5.09**	**14.885**	
	Grand Mean & SD =	**2.95**	**0.97**	**2.99**	**1.01**	**2.98**	

Table 4.1 which was for research question one showed that all the items were accepted. The respondents agreed improving accessibility to educational resources for students with disabilities contributes to sustainable development goals. Providing accessible digital learning platforms enhance the educational experience and support sustainable development. The confirmation was made with a grand mean of 2.95 and standard deviation of 0.97 for Students while that of Lecturers were 2.99 and 1.01 for mean and standard deviation.

Research Question 2: To what extent does Teaching and Learning Methods improve sustainable development in Rivers State University?

Table 4.2:   Mean and Standard Deviation on the Extent Teaching and Learning Methods improve sustainable development in Public Universities in Rivers Stat **E (N = 313)**

s/n	Item statement	Students = 298		Lecturer = 15		Mean set	Remarks
		$\overline{x}_1$	SD_1	$\overline{x}_2$	SD_2	$\dfrac{\overline{x}_1 + \overline{x}_2}{2}$	
1	teaching methods that incorporate sustainability-related topics help you understand and engage with sustainable development issues	3.12	1.07	3.13	0.96	**3.13**	High Extent

S/N	Item statement						Remarks
2	the use of interdisciplinary learning methods in your courses contribute to your understanding of complex sustainability issues	2.66	0.99	3.13	1.09	**2.90**	High Extent
3	incorporating sustainability-related topics into your teaching methods contributes to achieving sustainable development goals	2.73	1.17	3.00	1.03	**2.86**	High Extent
4	integrating interdisciplinary approaches in your teaching promote a comprehensive understanding of sustainable development among students	3.52	0.79	2.73	1.12	**3.12**	High Extent
5	adopting experiential learning techniques (e.g., field trips, hands-on projects) supports students' engagement with sustainability issues	2.54	0.91	3.60	0.71	**3.07**	High Extent
	Total	**14.57**	**4.93**	**15.59**	**4.91**		
	Grand Mean & SD =	**2.91**	**0.98**	**3.11**	**0.98**		

Source: Field Survey, (2024)

Table 4.2 which was for research question two showed that all the items were accepted. The respondents agreed that teaching methods that incorporate sustainability-related topics help you understand and engage with sustainable development issues. integrating interdisciplinary approaches in your teaching promote a comprehensive understanding of sustainable development among students. The confirmation was made with a grand mean of 2.91 and 0.98 while standard deviation of 3.11 and 0.98 for both Teacher and Lecturers.

Research Question 3: To what extent do Curriculum Design improve sustainable development in Public Universities in Rivers State?

Table 4.3:   Mean and Standard Deviation Scores on the Extent Curriculum Design improve sustainable development in Public Universities in Rivers State   (N = 313).

S/N	Item statement	Students = 298		Lecturer = 15		Mean set	Remarks
		$\overline{x}_1$	SD_1	$\overline{x}_2$	SD_2	$\dfrac{\overline{x}_1 + \overline{x}_2}{2}$	
1	inclusion of sustainability topics in the curriculum enhances your understanding of sustainable development goals	3.14	0.98	3.27	0.93	**3.20**	High Extent
2	curriculum to include interdisciplinary themes related to sustainability in helping you	2.61	0.99	2.53	1.02	**2.57**	High Extent

S/N	Item statement	$\overline{x}_1$	SD_1	$\overline{x}_2$	SD_2	Mean set	Remarks
	grasp the interconnectedness of global issues						
3	curriculum design includes opportunities for students to engage in sustainability-related research and projects	3.00	1.05	2.87	1.02	**2.94**	High Extent
4	providing students with exposure to diverse perspectives on sustainability (e.g., global, local) within the curriculum supports their understanding and commitment to sustainable development	2.99	0.83	3.20	0.98	**3.09**	High Extent
5	curriculum provides opportunities for engaging in sustainability-focused research and projects to enhance your learning experience	2.89	0.89	2.93	1.18	**2.91**	High Extent
	Total	**14.63**	**4.74**	**14.8**	**5.13**		
	Grand Mean & SD =	**2.92**	**0.94**	**2.96**	**1.02**		

Source: Field Survey, (2024)

Table 4.3 which was for research question three showed that all the items were accepted. The respondents agreed that inclusion of sustainability topics in the curriculum enhances your understanding of sustainable development goals. curriculum provides opportunities for engaging in sustainability-focused research and projects to enhance your learning experience. The confirmation was made with a grand mean of 2.92 and 2.96 and standard deviation of 0.94 and 1.02 as responses of the respondents on both Students and Lecturers.

Research Question 4: To what extent do support service improve sustainable development in Public Universities in Rivers State?

Table 4.3:   Mean and Standard Deviation Scores on the Extent support service improve sustainable development in Public Universities in Rivers State (N = 313).

S/N	Item statement	Students = 298		Lecturer = 15		Mean set	Remarks
		$\overline{x}_1$	SD_1	$\overline{x}_2$	SD_2	$\dfrac{\overline{x}_1 + \overline{x}_2}{2}$	
1	academic support services (e.g., tutoring, academic advising) help you achieve your educational goals and contribute to sustainable development	2.85	1.14	2.87	1.02	**2.86**	High Extent
2	counseling services are in supporting your mental health and well-being, thereby contributing	2.88	1.02	3.07	1.06	**2.97**	High Extent

	to a sustainable learning environment						
3	career services and guidance help you prepare for a career that aligns with sustainable development principles	2.90	1.11	3.00	0.82	**2.95**	High Extent
4	community engagement and volunteer opportunities through support services encourages students to contribute to sustainable development initiative	3.01	1.08	2.60	1.08	**2.80**	High Extent
5	student counseling services are in promoting well-being and sustainable development within the educational environment	3.00	0.97	2.40	0.95	**2.7**	High Extent
	Total	**14.64**	**5.32**	**13.94**	**4.93**	**14.28**	
	Grand Mean & SD =	**2.92**	**1.06**	**2.78**	**0.98**	**2.86**	

Source: Field Survey, (2024)

Table 4.4 which was for research question four showed that three items were accepted. The respondents agreed that student counseling services are in promoting well-being and sustainable development within the educational environment. counseling services are in supporting your mental health and well-being, thereby contributing to a sustainable learning environment. The confirmation was made with a grand mean of 3.05 and 0.90 and standard deviation of 2.76 and 0.99 respectively.

Test of Hypotheses

Hypothesis 1: There is no significant difference between lecturers and students in their mean rating on the extent to which Accessibility improve sustainable development in Public Universities in Rivers State.

Table 5:   **t-test Analysis of Mean Ratings of Lecturers and Students on the extent to which Accessibility improve sustainable development in Public Universities in Rivers State**

Respondents	N	$\bar{x}$	SD	df	p	t-cal	t-crit	Decision
Students	298	2.95	0.97					
				311	0.05	0.15	1.96	Accepted
Lecturers	15	2.99	1.01					

Source: Field Survey, (2024)

The data in table 5 revealed that the calculated t-test value of Students and Lecturers mean were 2.95 (Teacher) 2.99 (Lecturers) respectively, while the critical t value was 1.96 at degree of freedom of 311 at 0.05 significance level. Therefore, the null hypothesis was accepted.

Indicating there is no significant difference between lecturers and students in their mean rating on the extent to which Accessibility improve sustainable development.

Hypothesis 2: There is no significant difference between lecturers and students in their mean rating on the extent to which Teaching and Learning Methods improve sustainable development.

Table 6: **t-test Analysis of Mean Ratings of Lecturers and Students on the extent to which Teaching and Learning Methods improve sustainable development** in Public Universities in Rivers State.

Respondents	N	x̄	SD	df	p	t-cal	t-crit	Decision
Students	298	2.91	0.98					
				311	0.05	0.8	1.96	Accepted
Lecturers	15	3.11	0.98					

Source: Field Survey, (2024)

The data in table 6 revealed that the calculated t-test value of Teacher and Lecturers mean scores were 2.91 (Students) 3.11 (Lecturers) respectively, while the critical t value was 1.96 at degree of freedom of 311 at 0.05 significance level. Therefore, the null hypothesis was Accepted. Therefore, the null hypothesis was accepted. Indicating there is no difference between lecturers and students in their mean rating on the extent to which Teaching and Learning Methods improve sustainable development.

Hypothesis 3: There is no significant difference between lecturers and students in their mean rating on the extent to which Curriculum Design improve sustainable development

Table 7**: t-test Analysis of Mean Ratings of Lecturers and Students on the extent to which Curriculum Design improve sustainable development** in Public Universities in Rivers State

Respondents	N	x̄	SD	df	p	t-cal	t-crit	Decision
Students	298	2.92	0.94					
				311	0.05	0.15	1.96	Accepted
Lecturers	15	2.96	1.02					

Source: Field Survey, 2022

The data in table 7 revealed that the calculated t-test value of Students and Lecturers mean scores were 2.92 (Students) 2.96 (Lecturers) respectively, while the critical t value was 1.96 at degree of freedom of 311 at 0.05 significance level. Therefore, the null hypothesis was Accepted. Therefore, the null hypothesis was accepted. Indicating there is no difference between lecturers and students in their mean rating on the extent to which Curriculum Design improve sustainable development

Hypothesis 4: There is no significant difference between lecturers and students in their mean rating on the extent to which Support services improve sustainable development.

Table 8**: t-test Analysis of Mean Ratings of Lecturers and Students on the extent to which Support services improve sustainable development**

Respondents	N	x̄	SD	df	p	t-cal	t-crit	Decision
Students	298	2.92	1.06					
				311	0.05	0.53	1.96	Accepted
Lecturers	15	2.78	0.98					

Source: Field Survey, 2024

The data in table 8 revealed that the calculated t-test value of Students and Lecturers mean scores were 3.20 (Students) 2.99 (Lecturers) respectively, while the critical t value was 1.96 at degree of freedom of 311 at 0.05 significance level. Therefore, the null hypothesis was Accepted. Therefore, the null hypothesis was Accepted. Therefore, the null hypothesis was accepted. Indicating there is no difference between lecturers and students in their mean rating on the extent to which Support services improve sustainable development

Discussion of Findings

The findings revealed that improving digital accessibility to educational resources for students with disabilities contributes to sustainable development goals. providing accessible digital learning platforms enhance the educational experience and support sustainable development. The finding is in agreement with the view of Ainscow (2021), who opined that Accessibility is fundamental for creating an inclusive educational environment. This includes ensuring that campus facilities are physically accessible to students with disabilities, providing digital accessibility through compatible online learning platforms, and offering financial support to reduce socio-economic barriers.

The findings revealed that teaching methods that incorporate sustainability-related topics help you understand and engage with sustainable development issues. integrating interdisciplinary approaches in your teaching promote a comprehensive understanding of sustainable development among students. The findings are in agreement with the view of Ainscow, (2004). who opined that an inclusive curriculum design integrates diverse perspectives and learning needs into the academic content and structure. It involves creating course materials that reflect a variety of cultural, social, and experiential backgrounds. Additionally, it requires designing flexible and adaptable curricula that accommodate different learning styles and abilities. By

embedding inclusivity into the curriculum, institutions can ensure that all students engage with relevant and accessible content, which supports their learning and development.

The findings revealed that inclusion of sustainability topics in the curriculum enhances your understanding of sustainable development goals. curriculum provides opportunities for engaging in sustainability-focused research and projects to enhance your learning experience. This finding is in agreement with the view of Shyman, (2015), who opined that. The choice of teaching and learning methods significantly impacts the inclusivity of the educational experience. Employing student-centered approaches, such as differentiated instruction and universal design for learning (UDL), allows educators to address diverse learning needs effectively. This involves using various instructional strategies and tools to cater to different learning preferences and abilities, thereby ensuring that all students can engage with the material and achieve their academic goals.

Findings revealed that student counseling services are in promoting well-being and sustainable development within the educational environment. counseling services are in supporting your mental health and well-being, thereby contributing to a sustainable learning environment. This finding is in agreement with the view of Kiuppis, (2022). who opined that Providing comprehensive support services is crucial for helping students overcome various barriers to their education. These services include academic advising, counseling, disability support, and peer mentoring. By offering targeted assistance and resources, institutions can help students navigate challenges, enhance their academic performance, and foster a supportive learning environment. Effective support services contribute to an inclusive educational experience by addressing individual needs and promoting student well-being. By focusing on these four variables, tertiary institutions can create a more inclusive educational environment that supports sustainable development and ensures that all students have the opportunity to thrive. Addressing accessibility, designing inclusive curricula, employing effective teaching methods, and providing robust support services are essential steps in fostering an equitable and sustainable educational experience.

Conclusion

Based on the findings, it was concluded that improving digital accessibility accessibility to educational resources for students with disabilities contributes to sustainable development goals. providing accessible digital learning platforms enhance the educational experience and

support sustainable development. teaching methods that incorporate sustainability-related topics help you understand and engage with sustainable development issues. integrating interdisciplinary approaches in your teaching promote a comprehensive understanding of sustainable development among students. inclusion of sustainability topics in the curriculum enhances your understanding of sustainable development goals. curriculum provides opportunities for engaging in sustainability-focused research and projects to enhance your learning experience

Finally, it was concluded that inclusive education is not only a moral imperative but also a practical strategy for achieving sustainable development. By ensuring that all individuals have the opportunity to learn and thrive, inclusive education contributes to the creation of more equitable and sustainable societies. Policymakers, educators, and communities must work together to promote inclusive education and ensure that it remains at the forefront of efforts to achieve the SDGs.

Recommendations

1. Government should engage inexpensive public enlightenment campaigns to sensitise the citizenry of the rights and privileges of the all persons to equal educational opportunity no matter their nature and peculiarities.

2. Motivation strategies should be provided by government to encourage both lecturers and learners through different forms of Work incentives, free or subsidized cost of training, start-off grants alter training etc.

3. Teachers and guidance and counselors should be adequately and specially trained by government and prepared to be able to attend to the diverse needs inherent in an inclusive arrangement

4. Learners and graduates of inclusive education should reciprocate by acting as counselors and mentors to their special need counterparts thereby encouraging and motivating them to be educated for their individual livelihood and sustainable national development in Nigeria

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Quality Assurance Strategies in Secondary Education Management for Sustainable Development in an Artificial Intelligence Era in Nigeria

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Abstract

In order to ensure that educational institutions run smoothly and are successful, school management is essential. Secondary education in the modern world is typified by a traditional management system that is progressively becoming obsolete and mostly depends on paper-based procedures, tangible files, manual record-keeping, and in-person interactions. Therefore, in an era of artificial intelligence (AI), this research looks at quality assurance techniques in secondary school management for sustainable development. Policy and governance, curriculum development, coordinating education with sustainable development goals, data analytics for monitoring performance and results, combining AI with conventional approaches, blended learning, advancing sustainable development through quality assurance, curriculum design, enhanced communication, and collaboration were all covered as aspects of artificial intelligence's role in attaining quality assurance for sustainable development. The application of AI for sustainable development was shown to have certain limitations. Remedy proposals were based on limitations to quality assurance in artificial intelligence management. The study came to the conclusion that as society is changing, education must adapt to suit its demands. This can be accomplished by incorporating AI into secondary school administration.

Keywords: Artificial Intelligence, Development, Education, Era, Quality Assurance, Secondary, Sustainable.

Introduction

The process of teaching, learning, assessing, organising, planning, persuading, managing, and accrediting programs is known as management. According to Onye (2012), management is the process of organising, planning, directing, and assessing in order to achieve predefined goals by coordinating material and human resources. According to Koontz and Wihrich (2012), management is the process of creating and preserving an atmosphere where individuals collaborate in teams to effectively accomplish a common objective. The process of bringing people (teachers, pupils) and resources together to guarantee an efficient and functional educational system is known as educational management. To put it another way, management is the process of giving competent employees the necessary abilities to oversee

and manage the academic well-being of students and to keep a setting that is favourable to teaching and learning.

It is impossible to quantify the role that quality assurance plays in the education sector's continued existence and expansion. This is due to the fact that the growth of a given society is determined by the level of education provided to its members. Any country can meet the difficulties of social and economic change as well as technical advancements with the help of education. The substantial investment in education is predicated on the belief that it will play a part in social rebuilding, economic growth, and the establishment of long-term economic transformation. Only through educational initiatives and policies can the economy be transformed for sustainable development. Since the finest educational system equips students to be successful and contributing members of society, it must also adapt to changes that will propel societal development. The educational system needs to be designed to educate students for success in the global economy because the world is changing at a never-before-seen pace. Students must be taught new skills in digital technology and artificial intelligence in order to be relevant to society in the global economy. According to Anunobi and Jamacia (2023), the global economy was seen as a time of technological cooperation in the sharing of ideas and cultures in order to create a more comprehensive perspective. The transmission of technological skills, knowledge, and vocational skills for the sustainable development of society is a concern of education worldwide (Adiele E.E, Obasi K. K, Ohia, A.N. 2006).

Any civilisation that wants to advance and catch up to other societies must move away from certificate acquisition and towards a digital economy powered by contemporary teaching and learning technologies. In the context of education, quality assurance refers to the methodical procedures, guidelines, and practices used to guarantee that educational establishments fulfil their established standards for reliability, excellence, and consistency. Its goals are to increase learning outcomes, improve the learning experience, and encourage teacher and student accountability. (UNESCO, 2005). According to Sam-Kalagbor and Nwuke (2024), quality assurance has to do with policies, strategies and practices aimed at ensuring that schools carryout programmes that meets high standards and deliver effective learning outcomes. Quality education is a fundamental pillar for societal progress, and its significance at the secondary level cannot be overstated. In recent times, the need to enhance quality assurance mechanisms in schools has gained prominence, particularly within specific regions such as Rivers State. Quality education is a fundamental pillar for societal progress, and its significance

at the secondary level cannot be overstated. Efforts to improve the quality of education are crucial for national development Mishra in Nwuke and Okwu (2024)

According to Okunola and Olatunbo (2017). opined that quality assurance refers to the determination of standards, appropriate methods and quality requirements by an expert body, accompanied by process of inspection or evaluation that examines the extent to which practice meets standards. Its also referred to as quality in which those who are the recipient of a product or service make explicit their expectations for this product or service, and quality is defined in terms of meeting or exceeding the expectations of customers. Quality assurance is the efficient management, monitoring, evaluation and reviewing of the resources input and transformation process to produce the quality output in student that meets set standards and expectation of the society – (Aliyi, Sanusi & Ali said 2018). They further stated that quality assurance is a process of monitoring, assessing and evaluating all aspect of the education activities and communicating the outcome to all concerned with a view to improve the product of the education system.

Quality assurance is the relevant practical training component key to surmounting the challenges bedevilling secondary education in Rivers State. The foundation necessary for economic development in Nigeria is the right type of education. Quality curriculum with diverse subjects ought to be taught and studied systematically in secondary education. The challenges confronting the nation today, both in the education sector, industries, employment and the economy are because quality assurance in education has been neglected. Research has shown that advanced countries such as Japan, America and China have employed quality education as a major tool in the advancement of their societies. In the words of Anunobi, Ogbonna, and Iheme (2021), it is necessary to recognise the fact that the growth and effectiveness of technological development of any nation, especially Rivers State, is through her education. The citizens must be educated to effectively fit into all aspects of life in society. For any nation to develop, it must have well-educated citizens with relevant skills and knowledge in modern digital technology.

However, this aspect is a big challenge in the management of secondary education in Rivers State. This is due to the policies and attitude of the government in financing secondary education in Rivers State. Universal Basic Education (UBE) was established to stop the decay in the standard of education, but the essence of establishing Universal Basic Education seems defeated due to the attitude of the government in financing and implementing its policies. But

it is very possible to achieve quality in secondary education in the era of artificial intelligence if the government, stakeholders, and policymakers work their talk by providing qualified and well-trained teachers and facilities as well as promoting and implementing good policies. Hence the paper, "Quality Assurance Strategies in Secondary Education Management for sustainable Development in an Artificial Intelligence Era in Nigeria".

The Era of Artificial Intelligence AI.

The application of computer programs to address social and human issues is known as artificial intelligence (AI) (Aina M.A., Gbenga-Epebinu M.A., Olufinbiyi, R.O., Ogidan, O.C., and Ayedun, T.O. 2023). It can be programmed to mimic or pick up on human thought processes when addressing problems. In order to create computing systems that can perform human-like tasks like cognition, sensing, synthesis, and understanding of large data to solve complex problems, Shm'd (2023) claims that it is a collection of various digital technologies, including machine/deep learning, data mining, natural language processing, and neural networks. (Chatter Jee & Nhattchajee 2020, in Turgut Kara Kose and Jijen Tulubas 2024; Baker & Smith, 2019). Though its formal foundation was established in the middle of the 20th century, artificial intelligence has roots in ancient tales and folklore. The concept of universal machines that mimic any human intelligence process was introduced in 1950 by British mathematician Alan Turing. A certain amount of intelligence and computing equipment existed in 1950. Mac Carthy created artificial intelligence (AI) at the Dartmouth conference in 1956, which is considered to be the beginning of AI. Stated differently, the pioneers of artificial intelligence and symbolic approaches to problem-solving were John McCarthy, Marvin Minsky, Nathaniel Rochester, and Claude Shannon.

Other researchers created AI systems such as Shaky, the first general-purpose mobile reboot, and ELIZA, a real language processing program, between the 1960s and 1970s. AI had difficulties at this period because of data and processing power constraints. Expert systems that mimicked human experts' decision-making skills by using rule-based algorithms became more popular in the 1980s. An important development in artificial intelligence was thus made. Due to advancements in machine learning and edutech, the emergence of the internet, and an increase in computing capacity, artificial intelligence saw a rebirth in 2000. More complex algorithms have been developed since 1997, and deep learning which uses multi-layered neural networks has transformed artificial intelligence.

Managing Secondary Education in the Era of Artificial Intelligence

The digital economy, which involves interconnectedness through gadgets, media, or digital marketing services that are always accessible, is the era in which secondary education is managed in the age of artificial intelligence. It is the age of concepts, viewpoints, educational opportunities, and the replacement of human intelligence with technology. This is improved by the internet, which allows people to obtain pertinent information in the comfort of their homes, workplaces, or educational institutions. An essential connection between elementary and university education is secondary education. In the university where a greater level of workforce required by the country is attained, it establishes the quality and quantity of impact. Secondary education is a crucial stage of adolescence, when significant career decisions, ideal values, social norms, and life choices are determined, claims Nsude (2015). Secondary education in Nigeria is intended to promote national unity, which will lead to the advancement of the country. Youths will select their career enthusiasm during secondary education, which ultimately leads to a job. Secondary education nowadays is typified by paper-based procedures that are slowly becoming obsolete, such as manual record keeping, tangible files, and in-person instruction. Effectiveness and efficiency are also hampered by this. Tracking attendance, managing student records, and communicating with stakeholders all take a lot of work and are prone to mistakes and data loss. The shortcomings of these conventional methods become increasingly apparent as educational institutions work to enhance their operations and results. Planning, organising, coordinating, commanding, and controlling are all part of the process of educational management (Ame-organ, 2023). According to her, educational management is the mobilisation and use of educational resources (human, material, financial, and time) and methods for the articulation, implementation, and accomplishment of predetermined educational goals. Planning, arranging, staffing, leading, managing, and coordinating are all included, according to Dunga (2011). According to Peretomode (2012), planning and designing educational policies or programs with the goal of accomplishing educational objectives are the focus of educational planning. As a result, it entails the process of using both material and human resources to accomplish its objectives. For individuals who might not pursue higher education for any reason, it serves as a springboard to the workforce.

Artificial intelligence has infiltrated the general economy. This covers the banking, medical, educational, transportation, entertainment, advertising, and agricultural sectors. Adopting contemporary social learning strategies and programs is necessary to manage secondary education in this day and age. Because of the proliferation of technology in education,

secondary education administration is crucial in this day and age for all parties involved, including the government, educators, parents, students, and the general public. According to NPE (2014), implementing artificial intelligence in secondary education can help students achieve their learning objectives.

Artificial intelligence in secondary school will enable instructional material in various formats to support educational strategies and initiatives. E-equipment, chat GPT, learning management systems, student information systems (SIS), chatbots and virtual help, predictive analytical tools, and an automated report system will all be used in the application of artificial intelligence. These technologies will help with data management, regular automation tasks, attendance records, and customised learning. They will also improve school administration efficiency, enhance decision-making, boost student assistance, and ensure that limited resources are used effectively in the classroom. According to Novawan et al. (2024), implementing AI in institutions will increase productivity.

Education has been affected by the digital revolution, which has changed many facets of society. According to Living Stone (2015), the use of artificial intelligence (AI) in secondary education is known as the adoption of digital technology to improve administration, teaching, and learning processes. The desire to boost communication, increase efficiency, and offer individualised learning experiences is what is driving the shift in the usage of AI in secondary education management. Administrators and managers need to be trained in the use of digital tools and gadgets, including computers, smartphones, social media platforms, email, Google docs, and Microsoft packages, in order to achieve system efficiency.

Principals, board chairmen, directors, and even teachers need to receive training on how to use digital tools and devices in order to accomplish secondary school goals efficiently. digital resources including Google Photos, Zoom, Amazon, and Alexa (Singh 2023). The following tools can also be utilised, according to Hamud (2024): Google Bard, QuillBot, Owlift, Grammarly, Grade Scope, Fireflies, Otter AI, Copy AI, smartphones, PCs, emails, etc. Incorporating AI by administrators necessitates effective stakeholder contact using digital devices and technologies such as WhatsApp and email as avenues of communication between parents and teachers. Because they improve the flow of national and international information for adaptive learning programs that respond to learners' needs, consistent evaluation, and pertinent contents, with learning plans geared towards students' needs and performance, these tools are essential for the effective administration of secondary schools (Akpomi et al., 2022).

In order to promote the best possible operation of the school system, administrators must oversee teachers and students. Therefore, the employment of AI tools in secondary school has made it possible to conduct supervision via online platforms. This will guarantee that academic activities are appropriately conducted in order to meet the educational goals outlined in the national education policy.

The Role of Artificial Intelligence in Management of Secondary Education for Sustainable Development.

A stable government, by its nature, is supposed to be a key element in the development of any nation. The fact is that education in Nigeria is seen as an instrument for national development and social change. It is essential for the enhancement of quality of life. Education for sustainable development allows every human being to acquire the knowledge, skills, and attitude necessary to shape a sustainable future. Therefore, the role of artificial intelligence for sustainable development includes the following:

1. Developing artificial intelligence literacy among educators and administrators: In recent times, all human beings are competing to solve a problem, this is because of the rapid development of technology interfaces in particular. Therefore, educators and administrators are not left out. Artificial intelligence enables them to acquire literacy in artificial intelligence workshops, seminars, and webinars without limitation of time or place. A learning management system is also a software application or web-based technology used to plan, implement and assess a specific learning process and, in turn, develop them professionally. In Akpomi et al. (2022), artificial intelligence tools are very important in the administration of secondary education because they allow national and international information that advises educators of superlative conditions, instruction, adaptive learning programmes that depend on learners needs, and consistent appraisal learning content that is consistently geared towards students' performance.

2. Policy and governance: Artificial intelligence can help in governance and policy implementation. The quest for development now makes it imperative for government and policymakers to shift from the existing system of governance and policy formation by adopting the use of technologies. It also enables policymakers to choose the most efficient strategies by evaluating the outcome of implemented policies through feedback and assessment. Artificial intelligence can automate routine administrative tasks, provide decision support systems for school leaders, and continuously monitor the education process and outcome.

3. Curriculum development: According to Ekwuru and Anyanwu (2022), curriculum is viewed as a composite whole that includes learner, teacher, teaching and learning methodologies;

anticipated and unanticipated experience, curriculum must be dynamic and flexible in nature so as to address the needs of the learner and society in an era of technology. Artificial intelligence assists in developing a curriculum that emphasizes sustainable development principles that is geared towards ensuring that learners are educated about sustainability from an early age.

4. Aligning Education with Sustainable Development Goals (SDGS): The expansion of education has been one of the main factors influencing the economic and social advancement of the country. The government has been working towards building Nigeria as a country as a knowledge hub centre by expanding access to world- class secondary education through research, development, and innovation. It is important that secondary school students acquire higher skills and capacity, advanced knowledge, and optimum use of technology to address sustainable development challenges if they are to obtain growth in a global context. This can be made possible through artificial intelligence technology.

5. Incorporating artificial intelligence ethical standards: Secondary education development needs to be sustainable and should consider how to incorporate African cultural richness and tradition of living in harmony with nature. The initiatives should be supported by integrating sustainable development in the sector. This may require an increase in funding and reconciliation of current discipline-based educational structures with the transdisciplinary requirement for education for sustainable development. The strategy and plans of the government should be creating and improving capacity for sustainable development, which should rest on the development of a blueprint for economic security that also rests on a vibrant, innovative instrumentality of artificial intelligence technology.

6. Economic Insecurity: The areas of economic insecurity that pose threats to people and business survival are unemployment, poverty, and inflation. They, in turn, stifle sustainable development and impose a great strain on secondary education, where individuals, families, communities, businesses, organisations, and governments will now begin their searchlight for solutions (Thomas et al. 2017). Stakeholders are yet to come to terms with challenging economic insecurity, which is contagious. However, it could be addressed with AI technologies such as drones and robotics, which make proffer solutions to intelligent decisions, problem-solving and security checks.

Quality Assurance Strategies in the Management of Secondary Education for Sustainable Development in the Era of Artificial Intelligence
In the age of artificial intelligence, secondary education is run in the digital economy, which entails connectivity through constantly available devices, media, and digital marketing services.

This is the era of ideas, perspectives, learning possibilities, and technology replacing human intelligence. The internet makes this better by enabling people to access relevant information from the comfort of their homes, places of employment, or educational institutions. Secondary education is a crucial link between elementary and university education. It determines the quality and quantity of influence at the institution where a higher level of workforce needed by the nation is obtained. According to Nsude (2015), secondary school is a critical period of adolescence during which important judgements about one's ideal values, job, social standards, and way of living are made. The goal of secondary education in Nigeria is to foster national cohesion, which will advance the nation. In secondary school, young people will choose their career interests, which will eventually lead to employment. These days, secondary education is characterised by paper-based practices including manual record keeping, physical files, and in-person instruction that are gradually becoming outdated. This also hinders effectiveness and efficiency. It takes a lot of effort and is prone to errors and data loss to manage student records, track attendance, and communicate with stakeholders. As educational institutions strive to improve their operations and outcomes, the flaws in these traditional approaches become more noticeable.

The process of educational management includes organising, coordinating, commanding, controlling, and planning (Ame-organ, 2023). The mobilisation and use of educational resources (human, material, financial, and temporal) and procedures for the articulation, implementation, and achievement of predetermined educational goals is what she defines as educational management. According to Dunga (2011), these include organising, staffing, managing, leading, coordinating, and planning. The goal of educational planning, according to Peretomode (2012), is to plan and construct educational policies or programs in order to achieve educational objectives. Consequently, it involves the utilisation of both human and material resources in order to achieve its goals. Higher education acts as a launching pad to the workforce for many who might not otherwise pursue it.

The overall economy has been impacted by artificial intelligence. This includes the banking, healthcare, education, advertising, entertainment, transportation, and agriculture industries. Managing secondary education in the modern day requires implementing social learning programs and practices. These days, secondary education administration is essential for all stakeholders, including the government, educators, parents, students, and the general public, due to the widespread use of technology in the classroom. The use of artificial intelligence in

secondary education can assist pupils in meeting their learning goals, claims NPE (2014). In secondary education, artificial intelligence will make it possible to use a variety of forms for instructional materials that support educational goals and tactics. Artificial intelligence will be applied to e-equipment, chat GPT, learning management systems, student information systems (SIS), chatbots and virtual assistance, predictive analytical tools, and an automated report system. Data management, routine automated activities, attendance tracking, and personalised learning will all benefit from these technologies. Additionally, they will increase the effectiveness of school administration, improve decision-making, increase student support, and guarantee that the classroom's limited resources are used efficiently. AI implementation in institutions will boost production, claim Novawan et al. (2024).

The digital revolution has altered many aspects of life, including education. Artificial intelligence (AI) in secondary education is referred to be digital technology adoption to enhance teaching, learning, and administrative operations (Living Stone, 2015). The transition in the use of AI in secondary education management is being driven by the aim to improve communication, increase efficiency, and provide individualised learning experiences. To achieve system efficiency, administrators and supervisors must receive training on how to use digital tools and gadgets, such as computers, cell phones, social media platforms, email, Google Docs, and Microsoft packages.

To effectively achieve secondary school objectives, principals, board chairmen, directors, and even instructors must be trained in the use of digital tools and gadgets. digital resources such as Alexa, Zoom, Amazon, and Google Photos (Singh 2023). According to Hamud (2024), the following resources can also be used: Google Bard, QuillBot, Owlift, Grammarly, Grade Scope, Fireflies, Otter AI, Copy AI, emails, PCs, smartphones, etc. Effective stakeholder contact via digital devices and technologies like email and WhatsApp as channels of communication between parents and instructors is essential when administrators integrate AI. These tools are crucial for the efficient management of secondary schools because they enhance the flow of national and international information for adaptive learning programs that address learners' needs, consistent evaluation, and relevant contents, with learning plans tailored to students' needs and performance (Akpomi et al., 2022). Administrators must supervise instructors and students to ensure the school system runs as efficiently as possible. As a result, the use of AI tools in secondary education has enabled online platforms for supervision. This will ensure that

the educational objectives specified in the national education policy are met by conducting academic activities in an acceptable manner.

Challenges in Management of Secondary Education for Sustainable Development in the Era of Artificial Intelligence.

There are no clear-cut policy frameworks for the effective implementation of artificial intelligence in the management of secondary education. Even existing educational policies in Nigeria are not properly implemented. The reasons for the challenges are enormous, some of which include:

1. Poor Funding: Finance is the life wire of any organization. For any meaningful development to be actualized in the achievement of secondary education goals require meaningful funding. The education sector had over time suffered poor budgetary allocation over years. The budgetary allocation to the education sector is not up to 26%, according to the United Nations Education and Scientific Organization (UNESCO) recommendation of national budgets. Fund is money or finance made available for schools in order to meet up with the day to day running of the schools. Secondary education is suffering from inadequacy of funds which contributes to decline in the standard of education.

2. Cost of Technology and infrastructure: The cost of technological gadgets especially software highly exorbitant for many institutions, particularly those operating with limited budgets. The cost of these technologies are too high for a lot of institutions like the secondary schools to acquire. The cost does not only end with the initial investment, but maintenance and support cost, such as software updates, technical support system and upgrade, exorbitant internet rates and charges contribute to the financial strain of sustaining a digital system (Ogbonnaya 2017).

3. Lack of Power: Inadequate supply of electricity required for buildings to be used as storage and display rooms is another constraint in the implementation of artificial intelligence for sustainable development in the management of secondary education. Incorporating AI in schools require considerable power supply for computation which could be lacking in schools.

4. Problems of digital literacy and training needs: There are inadequate facilities for training and lack of skilled manpower to manage available technology at the secondary level. Most teachers are not trained and are unable to use the internet for accruable benefits of carrying out viable studies. It is necessary for staff, students and parents to transit to the digital system and develop digital literacy skills for navigation into the world of new technology.

This is important because not all stakeholders may be familiar with digital tools especially AI platforms and without proper skills, they may struggle to take full advantage of the system's benefits to adequately address this comprehensive training and support programmes to be established (Igwe 2000).

5. Data Privacy Issues: Data Systems play an important role in collecting and storing extensive personal and academic data which raises concerns regarding privacy and data protection. Educational institutions are obligated to adhere to pertinent data protection regulations to ensure robust safeguards are in place to protect the personal information of students and staff from unauthorized access, disclosure and misuses.

6. Cyber security concerns: Digital technology is vulnerable to various cyber threats, such as data breaches, malware attacks and phishing scams. Protecting sensitive information belonging to students and staff from unauthorized access or exploitation is a critical concern for educational institutions. These concerns are in areas of encryption to safeguard data, access controls to resist who can view or modify information and regular security audits to identify and address vulnerabilities. These measures require dedicated resources and expertise in maintaining a secure digital environment, which requires constant vigilance and adoption to new threats is a big challenge in management of secondary education.

Conclusion:

The paper concluded that society is evolving and education must be geared toward meeting the needs of society. This can be done through the integration of AI in the management of secondary education.AI tools are very important in the administration of secondary education in the service that enable administrator assess information both international and national which enhance the smooth ruling of the sector. Some of the AI tools that can be used in management of Secondary Education includes: ChatGPT, Students information system (SIS) learning management system, chatbot and virtual assistance, predictive analytical tools, automated report systems. These tools help in data management, automation routine task, personalized learning and increases efficiency in secondary school management. It enhances decision making, increased students support and optimization of resources in school system.

Suggestions:

1. The state government should ensure that its social infrastructures, such as electricity, improve significantly, especially in the secondary education sector, which will encourage and strengthen the academic activities in the school. This includes the use of technologies for sustainable development in society.

2. Managers of secondary education should ensure that a proper maintenance culture is developed for the management of technologies in the office or classroom that encourages artificial intelligence application in the secondary education system.

3. Management of secondary education should develop policies for constant training of teachers in secondary schools for sustainability.

4. The state government should increase its funding allocation to state institutions, which in turn would aid the acquisition and maintenance of technology facilities, meaningful contribution in secondary education that would enhance sustainable development and global competitiveness.

5. National digital economy strategy 2020-2023 which focuses on digital infrastructural development, skill acquisition, e-government implementation, entrepreneurship and innovation, and the adoption of artificial intelligence, blockchain and internet of thing (IOT) should be implemented for sustainable development.

6. There should be an enabling environment for digital growth for promoting digital literacy, enhancing e-governance, encouraging local content, improving broadband connectivity and strengthening cyber security measures in secondary education.

7. Government should encourage private sector investment in the area of technology to enhance provision and maintenance of digital tools at the secondary school level.

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Educational Management and Artificial Intelligence for Sustainable Development in Nigeria

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Abstract

The integration of artificial intelligence (AI) into educational management presents a transformative opportunity to enhance the quality, accessibility, and efficiency of education systems worldwide. This study explores the potential of AI to revolutionize educational management practices in pursuit of sustainable development goals (SDGs). By leveraging AI technologies, such as machine learning, natural language processing, and data analytics, educational institutions can optimize decision-making processes, personalize learning experiences, and improve administrative functions. The study examines the role of AI in addressing key challenges in educational management. Through a comprehensive review of existing literature, the research identifies best practices for implementing AI in educational settings and assesses the impact of AI-driven management systems on educational outcomes. Findings indicate that AI has the potential to significantly enhance the effectiveness of educational management by enabling data-driven decision making, reducing operational inefficiencies, and promoting inclusivity and equity in education. The study concluded that the integration of Artificial Intelligence (AI) within educational management presents a transformative opportunity for advancing sustainable development in Nigeria. The study therefore recommended that policymakers, educational leaders, and technology developers should ensure the responsible and effective integration of AI into educational management. Finally, the government and private sector should collaborate to improve the ICT infrastructure in educational institutions, particularly in underserved and rural areas. Reliable internet access, electricity, and digital devices are essential for effective AI integration.

Keywords: Education, Educational Management, Artificial Intelligence, Sustainable, Sustainable Development

Introduction

Education is an integral part of sustainable development; sustainable development serves as a solution to environmental degradation problems. Solving such problems requires a long-term and comprehensive strategy that takes into account the relationship between the environmental, social, and economic systems. According to Osuji, Wey–Amaewhule and Akide, (2023), provision of quality education is a priority that every country will aspire to include amongst the national goals of education. Therefore, it is imperative that educators and educational leaders prepare students who will be able to thrive and meet the challenges of the

future. The preparations should be geared towards qualitative improvement in diverse areas such as social justice, social equality, peace, health education, and environmental education, amongst others, for sustainable development. Education, according to Amadi and Urho, (2015), is a necessity for survival of man, it suggests development of valuable knowledge and skills in a society, it brings about in the persons submitted to it certain skills and attitudes that are adjudged to be useful and designable in the society. While, Leithwood, Harris, and Hopkins (2020), asserted that educational management encompasses several key elements, including creating a shared vision, building relationships, developing people, managing resources, and fostering learning communities. Hence, as technology continues to evolve, there is a growing interest in the use of artificial intelligence in educational settings, which, if further inculcated into educational management, has the potential to improve leadership, learning outcomes, and sustainable development (Sanchez-Carrillo, Cadarso, & Tobarra, (2021).

Artificial intelligence is a rapidly developing technological machine that can completely transform global sustainability initiatives as a result of its capability to perform tasks that typically require human intelligence. It plays a crucial role in educational leadership by streamlining administrative duties such as scheduling, record-keeping, grading, and decision-making, and also in teaching and learning by means of identifying areas for development and offering individualized support to instructors and students, which by extension will lead to sustainable development (Obadimeji & Oredein, 2022). Therefore, the aim of this study is to contribute to the growing body of knowledge by exploring ways in which artificial intelligence can be used in management of education for sustainable development in Nigeria.

Educational Management

Educational Management refers to the process of planning, organizing, directing, and controlling the activities and resources within an educational institution to achieve the desired educational goals and objectives. It encompasses a wide range of activities, from the administration of educational policies and programmes to the management of staff, students, and resources. According to Okeke (2023), education management is a construct that has to do with the planning, organizing, coordinating, directing, and monitoring of the activities of schools and effectively utilizing human and material resources available to them to successfully accomplish the objectives of institutions of learning. It involves the alignment of physical, financial, and human potentials in the school with the aim of optimally achieving the school goals (Curic, Lazarevin & Brzakovc, 2018). Educational management plays a major role in the

successful running of educational institutions, as it encompasses procedures used in leading and managing educational organizations such as schools, colleges, and universities towards actualizing stated goals and objectives.

According to Sergiovanni and Starratt (2013), educational management is a critical factor in determining the success of educational institutions. A shared objective can be achieved by staff members who are inspired and motivated by effective educational managers. Additionally, they are able to develop an environment in the school that fosters learning and the wellbeing of all parties involved. Similarly, promoting equality and social justice in education also requires strong educational leadership. Emdin (2020) noted that educational leaders must be committed to addressing systemic inequalities and ensuring that all students have access to high-quality education. They must also be eager to engage in critical self -reflection and work to develop inclusive and culturally sensitive learning environments. The educational leader possesses certain traits, personalities, behaviours, patterns, such as instructional leadership, transformational leadership, servant leadership, ethical leadership, distributed leadership, and digital leadership, among others (Xie, 2020).

Artificial Intelligence

Artificial Intelligence (AI) refers to the simulation of human intelligence in machines that are designed to think, learn, reason, and make decisions. AI systems are capable of performing tasks that typically require human intelligence, such as visual perception, speech recognition, decision-making, language translation, and problem-solving. The goal of AI is to create systems that can function autonomously, adapt to new situations, and improve their performance over time through learning (Liu, Mazumder, Robertson, & Grigsby, 2023). The first attempts to create machines that could think and learn like people were made in the 1950s, when artificial intelligence was first studied. Rule-based systems, neural networks, machine learning, and deep learning are just a few of the stages that artificial intelligence research has gone through. Russell and Norvig (2021) stated that recent advances in artificial intelligence have been fueled by the availability of large datasets, improved computing power, and sophisticated algorithms. Artificial intelligence can be classified into two main types: narrow or weak artificial intelligence and general or strong artificial intelligence. Narrow artificial intelligence is designed to perform specific tasks, such as playing chess or detecting fraud, and it operates within a limited domain. General artificial intelligence, on the other hand, is designed to

perform any intellectual task that a human can do, and it is not limited to a specific domain (Charlotte, 2022).

Healthcare, finance, transportation, and education are just a few of the domains where artificial intelligence has a wide range of applications. Artificial intelligence is being used in healthcare to identify ailments, create individualized medicines, and examine x-ray pictures. Also, artificial intelligence is being used in finance to spot fraud, examine financial markets, and offer individualized investment guidance. Similarly, artificial intelligence is being applied in the field of transportation to create autonomous vehicles and improve traffic flow. In education, artificial intelligence is being used to personalize learning, analyses student performance, and develop intelligent tutoring systems (Chui, Manyika, Miremadi, Henke, Chung, Nel & Malhotra, 2018). It is also a machine that makes use of algorithms and statistical models to analyse data and make decisions or predictions based on that analysis. It provides the opportunity to use a large scale of knowledge that is in some way structured and suitable for use in the educational process to solve certain educational problems and that is personalized for each student (YuskovychZhukovska, Poplavska, Diachenko, Mishenina, Topolnyk, & Gurevych (2022). However, there is a need for accountability and transparency in the development and deployment of artificial intelligence systems to ensure that they are used in ways that are consistent with ethical principles (Floridi, Cowls, Beltrametti, Chatila, Chazerand, Dignum & Luetge, 2018).

Sustainable Development

Sustainable development is a development approach that seeks to meet the needs of the present without compromising the ability of future generations to meet their own needs. It emphasizes the balance between economic growth, social equity, and environmental protection. Sustainable development aims to create long-term well-being for both people and the planet by integrating these three pillars economic, social, and environmental into development strategies and policies(Ranjbari, Esfandabadi, Zanetti, Scagnelli, Siebers, Aghbashlo, & Tabatabaei, 2021).Due to growing concerns about how human activity affects the environment and the need to make sure that economic development does not come at the expense of future generations, the notion of sustainable development has received a lot of attention in recent years. The Brundtland Report, which was released in 1987 by the International Commission on Environment and Development, was the first to establish the idea of sustainable development. According to the report, sustainable development is "development that meets the needs of the

present without compromising the ability of future generations to meet their own needs" (WCED, 1987).

Sustainable development encompasses three key dimensions: economic, social, and environmental. These dimensions are often referred to as the "triple bottom line" (Elkington, 1998). Economic sustainability involves promoting economic growth and development while ensuring that resources are used efficiently and that economic benefits are distributed fairly. Social sustainability involves promoting social equity, justice, and inclusion and ensuring that everyone has access to basic needs such as food, shelter, and healthcare. According to Song, Wu, Dong and Dinçer, (2023), environmental sustainability involves protecting natural resources and reducing pollution and waste. However, the balancing of the economic, social, and environmental components is one of the difficulties of sustainable development. This requires taking a holistic approach to development that takes into account the interconnections between these dimensions. Another important development in sustainable development was the adoption of the United Nations Sustainable Development Goals (SDGs) in 2015. The SDGs are a set of 17 goals and 169 targets that aim to end poverty, protect the planet, and promote prosperity for all (UN, 2015). The SDGs provide a framework for governments, businesses, and civil society to work together to achieve sustainable development.

Artificial Intelligence for Sustainable Development

Artificial intelligence can be defined as a computational mechanism that enables computerized robots or software systems to engage in critical thinking and problem-solving activities in a manner that resembles the thinking patterns of an intelligent human. It is an advanced technology that has the potential to make a significant contribution to sustainable development in areas such as transportation, agriculture, healthcare, energy, and education, among others. Artificial intelligence can also help address global challenges such as climate change, poverty, and hunger, which are key objectives of sustainable development. Similarly, artificial intelligence can also help deliver sustainable education content that promotes environmental awareness and fosters sustainable behaviours among students (Schoormann, Strobel, Möller, Petrik & Zschech, 2023).

Roles of artificial intelligence in actualizing sustainable development goals:

    i.   **Personalized learning:** learning experiences that are tailored and catered to each student's needs can be made using artificial intelligence by analysing data on their learning preferences, interests, and passions. Students may benefit from this as they

get the skills and information necessary to contribute to a future that is more sustainable, as well as a greater understanding of difficult sustainability-related themes.

ii. **Virtual Classrooms**: AI enables remote learning and digital classrooms, expanding access to quality education for students worldwide, including in conflict zones and rural areas.

iii. **Data analysis:** With artificial intelligence, it is possible to find trends, patterns, and areas for improvement in complex data relevant to sustainability, such as climate data or environmental impact assessments. This will aid educators and policymakers in making data driven judgements about sustainability initiatives and interventions.

iv. **Curriculum Design**: AI can analyse vast amounts of educational data to identify trends, gaps, and opportunities, helping educators design more relevant and effective curricula that align with the needs of a rapidly changing world.

v. **Research and innovation:** Artificial intelligence can aid in promoting research and innovations in the field of sustainability by evaluating data, modelling scenarios, and spotting new prospects, amongst others Sustainable development goals can be achieved more quickly as a result of this.

vi. **Accessibility:** Artificial intelligence has the potential to make education more accessible for students who have special needs or who might have trouble adjusting to traditional classroom settings. Artificial intelligence-driven voice assistants and chat bots, for instance, may offer students individualized support and direction, and virtual and augmented reality technologies can produce immersive learning experiences that are accessible from any location.

Artificial Intelligence and Educational Management for Sustainable Development

The 21st century has witnessed a rapid advancement in technology that has revolutionized various aspects of life. Artificial Intelligence (AI) has emerged as one of the most transformative technologies in recent times (Goksel & Bozkurt 2019). Artificial Intelligence (AI) has emerged as a revolutionary technology that has the potential to transform various sectors, including education. In recent years, AI has been adopted in various educational institutions as a means of improving learning outcomes and enhancing the quality of education (Wang, 2021). Educational leadership, in particular, can leverage AI to improve the quality of education, enhance the effectiveness of teaching, and increase the efficiency of administrative processes (Tapalova, Zhiyenbayeva & Gura 2022). One of the critical roles of AI in educational

leadership is to provide personalized learning experiences for students. AI powered educational platforms can use data analytics to monitor students' progress and provide customized learning materials based on their individual learning styles, interests, and abilities (Seo, Tang, Roll, Sidney, Dongwook, 2021). AI can help ensure that every student receives the education that suits their needs, thereby improving learning outcomes.

Another role of AI in educational management is to support teachers in their daily tasks. AI powered tools can help teachers assess student performance, grade assignments, and provide feedback in real-time (Sharma, Undheim, & Nazir, 2022). This can free up teachers' time and allow them to focus on higher-order tasks such as lesson planning, curriculum development, and mentoring students. AI can also help identify students who need extra support, enabling teachers to provide timely and targeted interventions. AI can also play a crucial role in administrative processes in educational institutions. AI-powered systems can automate routine administrative tasks such as student record-keeping, scheduling, and course planning (Okonkwo & Abejide 2021). This can save time and reduce administrative errors, enabling educational institutions to allocate more resources to core educational activities. The implications of AI in educational leadership for national development are immense. By leveraging AI, educational institutions can improve the quality of education, increase access to education, and reduce educational inequalities (Igbokwe, 2023). This can lead to a better educated workforce, which can help drive economic growth and development. AI can also help bridge the digital divide by providing access to education to students who may not have access to traditional educational resources (Wang, 2021).

The Relationship between Educational Management and Artificial Intelligence

The relationship between educational management and artificial intelligence (AI) lies in how AI enhances and supports the functions, decision-making, and overall efficiency of educational management. By integrating AI technologies, educational management becomes more data-driven, adaptive, and innovative, enabling better governance, resource optimization, and academic outcomes. Here's a breakdown of their relationship:

1. **Enhancing Core Functions of Educational Management**

Educational management focuses on planning, organizing, directing, and controlling educational systems. AI complements these functions by: (i) Data-Driven Planning: AI analyses vast amounts of data (e.g., enrolment trends, performance metrics) to support informed planning and policy development (ii) Efficient Organization: AI streamlines administrative

tasks such as scheduling, resource allocation, and communication (iii) Improved Direction and Leadership: AI tools like predictive analytics help managers foresee challenges and implement proactive strategies (iv) Effective Monitoring and Control: AI-powered dashboards provide real-time monitoring of institutional performance, ensuring timely interventions.

2. AI Applications in Educational Management

AI impacts various aspects of educational management, including:

i) Administrative Efficiency: Automates repetitive tasks (e.g., admissions processing, attendance tracking) and reduces errors and enhances resource management

ii) (ii) Personalized Learning: AI-driven learning management systems (LMS) enable tailored instruction to meet individual student needs. Also facilitates adaptive teaching approaches based on student performance data.

iii) Teacher Support and Development: AI provides insights into teacher effectiveness and identifies areas for professional development. It also offers AI-driven training modules to help educators refine their skills.

iv) Decision Support Systems: AI-based predictive analytics helps managers make data-driven decisions, forecasts student enrolment, dropout rates, and other critical metrics.

v) Resource Optimization: AI optimizes the allocation of resources like classrooms, staff, and learning materials to ensure efficiency.

vi) Equity and Accessibility: AI tools support inclusive education by providing assistive technologies for students with disabilities. Also, language translation systems promote education in multilingual settings.

The Role of AI in Educational Management for Sustainable Development

The role of Artificial Intelligence (AI) in educational management for sustainable development is transformative, offering innovative solutions to enhance the efficiency, inclusivity, and quality of education systems while aligning with the goals of sustainable development. Below is a detailed analysis of how AI contributes to educational management within the framework of sustainable development:

1. Streamlining Administrative Processes: AI automates routine tasks in educational management, reducing manual workloads and increasing operational efficiency. This ensures that resources are used optimally, a key aspect of sustainable development.

Examples: Automating student enrolment, attendance tracking, grading, and resource scheduling.

2. Enhancing Decision-Making with Data-Driven Insights: AI provides predictive analytics and actionable insights based on large datasets, helping educational managers make informed decisions. Examples: Predicting student enrolment trends, identifying at-risk students, and forecasting resource needs.

3. Promoting Inclusive Education: AI supports inclusivity by addressing the diverse needs of learners, including those with disabilities or from marginalized communities. Examples: AI-driven assistive technologies such as text-to-speech for visually impaired students, and real-time language translation tools.

4. Supporting Personalized Learning: AI facilitates adaptive learning experiences that cater to individual student needs, improving academic outcomes and engagement. Examples: AI-based learning management systems (LMS) that adjust curriculum pacing based on student performance.

5. Optimizing Resource Utilization: AI enables efficient allocation of physical, financial, and human resources within educational institutions. Examples: Optimizing classroom usage, scheduling faculty, and managing budgets.

6. Enhancing Teacher Development and Support: AI provides tools for teacher training, professional development, and workload management. For instance, AI-powered platforms for continuous learning and performance evaluation.

7. Monitoring and Evaluating Educational Progress: AI offers real-time monitoring tools that track educational outcomes, ensuring alignment with the Sustainable Development Goals (SDGs). For examples, dashboards that visualize key metrics such as student achievement, dropout rates, and resource distribution.

Challenges faced by Educational Managers in Maximising AI for Sustainable Development in Nigeria

The integration of Artificial Intelligence (AI) in the educational sector has the potential to transform the way students learn and teachers teach, ultimately leading to sustainable development. However, educational managers in Nigeria face several challenges when trying to maximize the potential of Artificial Intelligence (AI) for sustainable development. These challenges are multifaceted and are influenced by the country's socio-economic conditions, infrastructure, policy environment, and the state of the education system.

Firstly, limited access to technology poses significant challenge. Many educational institutions in Nigeria lack the necessary technological infrastructure to implement AI effectively. This includes insufficient access to computers, internet connectivity, and reliable electricity, especially in rural areas. Without these foundational elements, deploying AI tools in education remains a significant hurdle.

Secondly, digital divides, the disparity between urban and rural areas in terms of technology access creates a digital divide that hinders equitable implementation of AI across the country. Educational managers struggle to ensure that all students have equal access to AI-driven learning tools and resources.

Thirdly, shortage of AI expertise is also a significant challenge. There is a shortage of educators and administrators with the expertise to integrate and manage AI technologies within educational settings. Training programmes in AI for educational purposes are limited, which hampers the ability of educational managers to effectively implement and sustain AI initiatives. Developing the capacity of teachers, administrators, and students to use AI effectively requires significant investment in professional development and training, which is often lacking due to budget constraints and policy gaps.

Fourthly, high costs of AI implementation pose a serious challenge. The cost of acquiring, developing, and maintaining AI technologies is a major challenge for many educational institutions in Nigeria. Government funding for education is often insufficient, and private institutions may also struggle to afford the necessary investments in AI. Given the limited resources, educational managers often have to prioritize basic needs over technological innovations like AI. This can delay the adoption of AI tools that could enhance educational management and outcomes.

Lastly, lack of AI-integrated curriculum is another challenge. The current educational curriculum in Nigeria does not fully integrate AI concepts or digital literacy, which are essential for preparing students for the future. Educational managers face the challenge of revising and updating curricula to include AI-related content while ensuring it aligns with sustainable development goals.

Ways of Addressing the Challenges

Addressing the challenges faced by educational managers in maximizing AI for sustainable development in Nigeria requires a multifaceted approach involving policy reforms, capacity

building, infrastructure development, and stakeholder engagement. Here are the key strategies to overcome these challenges:

Investment in ICT Infrastructure: The government and private sector should collaborate to invest in the necessary ICT infrastructure, such as broadband internet, reliable electricity, and computer labs, particularly in rural and underserved areas. Public-private partnerships can help bridge the infrastructure gap.

Digital Literacy Programmes: Implementing digital literacy programs for both students and educators is essential to ensure they can effectively use AI tools. These programs should be integrated into the curriculum at all levels.

AI Training for Educators and Administrators: Continuous professional development programs should be established to train educators and administrators in the use of AI technologies. This includes workshops, certification courses, and online training modules focused on AI integration in educational management.

Development of AI Curriculum: Educational institutions should incorporate AI and digital literacy into their curriculum to prepare students for the future workforce. This can be done by partnering with tech companies and universities to design relevant courses and learning materials.

AI Research and Development Centers: Establishing AI research centers within universities and colleges can foster innovation and provide a platform for educators to experiment with AI applications in education.

Government Funding and Grants: The government should increase funding for AI initiatives in education, providing grants and subsidies to schools and institutions that are willing to adopt AI technologies. Special funding programs can be created to support schools in rural or disadvantaged areas.

Conclusion

The integration of Artificial Intelligence (AI) within educational management presents a transformative opportunity for advancing sustainable development in Nigeria. This study has highlighted the potential of AI to enhance the quality, accessibility, and efficiency of education, thereby contributing to the achievement of sustainable development goals (SDGs). By leveraging AI, educational managers can better address challenges such as: (i) resource

allocation (ii) curriculum development (iii) personalized learning, and (iv) administrative efficiency, which are critical to improving educational outcomes across the country. However, the study also identified several challenges that must be addressed to fully realize the benefits of AI in the Nigerian educational context. These challenges include inadequate infrastructure, lack of skilled personnel, financial constraints, policy gaps, and resistance to change. Addressing these barriers requires a concerted effort from the government, educational institutions, private sector, and other stakeholders. Investments in ICT infrastructure, capacity building, policy development, and public awareness are essential to create an enabling environment for AI-driven educational management.

Furthermore, the study underscores the importance of ethical considerations in the deployment of AI, ensuring that technologies are used responsibly and inclusively to avoid exacerbating existing inequalities. A well-implemented AI strategy in education can contribute significantly to reducing educational disparities, promoting lifelong learning, and fostering a more equitable and sustainable society. Finally, while the road to fully integrating AI into educational management in Nigeria may be challenging, the potential rewards are immense. By addressing the identified challenges and harnessing the power of AI, Nigeria can make significant strides towards achieving sustainable development in education. The findings of this study call for immediate action to build the necessary infrastructure, develop relevant policies, and promote a culture of innovation that will enable the educational sector to meet the demands of the 21st century and beyond.

Recommendations

The recommendations provided in this study are aimed at guiding policymakers, educational managers, and stakeholders in harnessing the potential of AI for educational management and sustainable development in Nigeria. By addressing the identified challenges and implementing these strategies, Nigeria can create a more inclusive, efficient, and forward-looking educational system that contributes to the broader goals of sustainable development. The recommendations are stated below:

1. **Investment in ICT Infrastructure:** The government and private sector should collaborate to improve the ICT infrastructure in educational institutions, particularly in underserved and rural areas. Reliable internet access, electricity, and digital devices are essential for effective AI integration.

2. **Provision of Digital Resources:** Educational institutions should be provided with affordable and accessible digital resources, including AI-powered educational tools and platforms, to facilitate teaching, learning, and management.

3. **Training Programs for Educators and Administrators:** Comprehensive training programs should be developed to equip educators and administrators with the necessary skills to integrate AI into educational management. These programs should cover AI literacy, data management, and the use of AI tools for personalized learning and decision-making.

4. **Incorporating AI in Curriculum:** The curriculum at all levels should be updated to include AI and digital literacy components, preparing students for the future workforce and promoting lifelong learning.

5. **AI Research Centers:** Establish AI research and development centers in universities and educational institutions to drive innovation and explore new applications of AI in education. These centers can also serve as hubs for collaboration between academia, industry, and government.

6. **Data Protection and Ethics:** Regulatory bodies should enforce data protection laws to safeguard students' and educators' information, ensuring that AI tools are used in a manner that respects privacy and promotes inclusivity.

7. **Increased Funding for AI Initiatives:** The government should allocate more funds to AI-driven educational projects, offering grants and subsidies to institutions that adopt AI technologies. Private sector investment in educational technology should also be encouraged.

8. **Partnerships and Collaborations:** Educational institutions should seek partnerships with tech companies, NGOs, and international organizations to access additional resources, expertise, and innovative solutions for AI integration.

9. **Long-term Planning and Support:** Educational institutions should develop sustainability plans for AI initiatives, ensuring that they can be maintained and updated over time. This includes planning for on-going training, technical support, and infrastructure upgrades.

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Artificial Intelligence (AI) as a Paradigm Shift in Retooling Human Resource Cycle Operations for Staff Productivity in Nigerian Universities

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Abstract

The title of the paper is, "Artificial Intelligence (AI) as a Paradigm Shift in Retooling Human Resource Cycle Operations in Nigerian Universities". It is a discourse of conceptual reviews germane for the 21st Century universities which encompassed the following areas: conceptualisation of artificial intelligence; artificial intelligence as a digital technology for enhancing staff recruitment and staff selection process; staff development programmes; staff appraisal and staff remuneration for staff productivity as well as the nexus between the human resource cycle operations and staff productivity. Reviewed literature depicted that, AI chatbots facilitate screening, short listing and scheduling of candidates for interviews and also transmit relevant information to applicants. It has the ability to effectively sort out resumes and screen such unbiasedly thus providing unparalleled opportunities for all participants which are hallmarks for productivity in the future. It was therefore concluded that, artificial intelligence digital technologies would foster staff productivity if utilised. Suggestion made among others was that artificial intelligence digital technologies should be employed in the management of the human resource cycle operations in universities as this would enhance staff productivity in Nigerian Universities.

Keywords: Artificial Intelligence Digital Technologies, Staff Recruitment, Staff Selection, Staff Development, Staff Appraisal, Staff Remuneration.

Introduction

Education has often been adjudged as a veritable tool for national development because of its etymological background. The term education was derived from three Latin words namely: "educatum", "educare" and "educere". Although their derivatives may differ in certain aspects but their underlining meanings are the same (Amie-Ogan & Amie-Ogan, 2015). Educatum means the act of teaching and training while educare means "to bring up" or "to raise" and educere means "to lead forth" or "to come out". These derivatives portray that, before the recipients got engaged in education, they groped in utmost ignorance, total darkness and obscurity but their involvement in the education process enlightened them, thereby achieving social, economic and political emancipation (Ibid, 2015). It can therefore be deduced that education enables its recipients to be abreast with necessary skills, abilities, and knowledge to navigate the 21st Century.

However, in navigating choice career paths in institutions of learning, its administration would need necessary digital technologies. This has brought today's organisations to limelight in their quest for best strategies to having a competitive edge over their rivals with artificial intelligence being adopted in all facets of organizational life. The world of work all over the world tend to experience some form of dynamism as it endeavours to meet the goals of global competitiveness, diversity and inclusiveness. It is worthy of note that Covid-19 pandemic in the less developed countries initiated the use of digital technologies and adaptive workplace principles which increased flexibility and knowledge sharing at the workplace with skills such as collaboration, teamwork, creativity, problem-solving and critical thinking (Amie-Ogan, Epelle & Oguru, 2023).Gradually, the 21st Century workplace is experiencing a paradigm shift from simple technologies to a more complex and robust digital technology known as artificial intelligence. The concept of artificial intelligence dates as far back as ancient times when Greek myths explained how mechanical men were created by gods. This wild imagination was furthered by scientific innovativeness which led to artificial intelligence being coined by John McCarthy and his co-researchers at a conference held at Dartmouth College, New Hampshire in 1956 and from thence was referred to as the father of artificial intelligence (Rajaraman, 2014). Artificial Intelligence (AI) had since then evolved tremendously and widely as well as been appreciated as a field of Computer Science. Artificial Intelligence (AI), is a field of Computer Science that focuses on developing intelligent machines that can perform tasks that require human intelligence such as understanding language, making decisions and solving problems. In recent times, AIis well utilized in sectors such as: Healthcare, Medicine, Agriculture, Hospitality, Banking, Engineering, Business Enterprises and Educational Institutions.

Universities as educational institutions which are often referred to as ivory towers require quality employees in terms of qualifications, knowledge, skills, abilities, experience and physical fitness, and to achieve the afore mentioned indices in Universities, AI ought to be employed for human resource cycle projects to ensure productivity of staff. Employee productivity is the quantifiable measure of an employee's output or efficiency in completing their assigned tasks or responsibilities within a specific period (Simpplr, 2024). Productivity in an organisation is brought about by efficient and effective use of organizational resources and the most important resource which is a great asset to any organization is the human resource. Where human resources of an organization are thoroughly exposed to proper recruitment and selection processes the best recruitees would undergo a thorough screening procedure to fill up

vacant positions, thus giving their best for organizational progress coupled with good remuneration, training and development and promotion (Amie-Ogan, 2023). Hence the discourse on, "Artificial Intelligence (AI) as a Paradigm Shift in Retooling Human Resource Cycle Operations for Staff Productivity in Nigerian Universities".

Concept of Artificial Intelligence

Artificial intelligence (AI) is a field of science concerned with designing of computers and machines that can reason, learn and act in such a way that would normally require human intelligence. Operationally, it is defined as a set of technologies that are based primarily on machine learning and deep learning with emphasis on the use of data analytics, predictions and forecasting, object categorization, natural language processing, recommendations, intelligent data retrieval and more (Googlecloud.com). Kaplan and Haenlein (2019), defined AI as a system's ability to interpret external data correctly, to learn from such data, and to use that learning to achieve specific goals and tasks through flexible adoption. Similarly, Aggarwal and Kathuria (2023), defined AI, as the use of technology to perform tasks that require human intelligence while referring to it as machine intelligence. In essence artificial intelligence is the collaborative functioning of machines in the similitude of human intelligence which tend to surpass human capacity in the actual workplace. Human beings have feelings and are therefore susceptible to frailties of boredom and tiredness but machines keep working for longer time as far as proper maintenance culture is observed.

Artificial Intelligence as a Digital Technology for Enhancing Staff Recruitment and Selection Procedures for Staff Productivity.

Artificial Intelligence (AI) is transforming different areas of human resource management, namely in the recruitment and selection procedures, which play key roles in improving staff productivity globally in universities. AI-driven technologies are replacing traditional recruitment methods due to their ability to improve efficiency, accuracy and fairness in selecting candidates for academic and administrative jobs. Traditional approaches to recruitment such as paid announcement over the radio and television, advertisement in dailies (National and Local Newspapers), visiting youth service orientation camps, visiting universities to recruit prospective graduates and visiting neighbouring states and countries abroad for recruitment are typically cumbersome, time-consuming and influenced by human prejudice (Amie-Ogan, 2023). However, the adoption of AI in recruitment is more than just a technological process as it signifies a paradigm shift in institutions' traditional approach of

hiring to a modern approach which has proved to be substantial in all ramifications for staff productivity. The Nigerian University system needs well-qualified academic and administrative personnel in pursuit for high educational standards which can only be achieved through the integration of artificial intelligence (AI) in the recruitment and selection procedures. There is no doubt that, the adoption of AI in the hiring process offers Nigerian Universities a leeway for tackling anticipated setbacks to their hiring process. Traditional recruitment approaches frequently entail a laborious task of manually reviewing a humongous number of applications which is both time-consuming and prone to errors and prejudices. Human recruiters may inadvertently exhibit bias towards particular candidates due to subjective considerations, resulting in suboptimal hiring outcomes. On the contrary, Artificial Intelligence (AI) can automate the earliest stages of the recruitment process through resume screening. This can be achieved through the use of algorithms that objectively evaluate candidates' qualifications, gender, age, experience and level of education based on established criteria. The possibility of reducing prejudice makes the selection process meritocratic, leading to improved quality of hiring and ultimately enhancing staff productivity (Babalola, Adeyemo, & Onifade, 2020)

In addition, AI technologies can improve applicants screening process by employing sophisticated tools like predictive analytics and machine learning. These technologies have the capability to analyse extensive quantity of data regarding candidates' previous achievements, educational histories and perhaps psychometric evaluations in order to forecast their future job performance (Upadhyay & Khandelwal, 2018). Such data-driven insights assist human resource or hiring managers to make better informed selections, ensuring that the selected applicants are not only competent but also have the capacity to flourish in their roles, duties and responsibilities. This is particularly essential in the academia where the productivity of staff members is considered to be a function of the quality of instructional delivery, research and community service outputs. By selecting individuals with the highest potential for productivity, AI would helpin the strategic goal of boosting the overall efficacy of Nigerian Universities (Obikeze & Onwe, 2022).

Additionally, AI may streamline the selection process by automating regular operations, such as scheduling interviews, sending follow-up emails and even performing initial interviews using AI-powered chatbots (Ogunleye & Adeyemi, 2019). These automated solutions may engage applicants in real-time, providing them with vital information and addressing queries which would enhance candidates experience. A great recruitment experience is vital for attracting top talents since it represents the institution's efficiency and modernity. Furthermore,

by freeing up human resource managers and executive managers (recruiters) from routine chores, AI helps them to focus on more strategic activities, such as communicating high-potential prospects and ensuring that the recruitment process corresponds with the University's long-term goals. This strategic goal is vital for establishing a productive workforce that can contribute to the institution's academic and administrative success (Akinyele & Akinbode, 2021).

Another key advantage of AI in recruitment is its capacity to collect and analyze enormous datasets to uncover trends and patterns that might not be immediately obvious to human recruiters. In this instance, AI can evaluate data from past recruitment cycles to discover the characteristics of successful hires which can then drive future recruitment methods. This data-driven strategy does not only enhance the effectiveness of recruitment but also ensures that the University consistently improves on its hiring methods based on empirical evidence. With this approach, AI contributes to the formation of a more robust and adaptive workforce, capable of handling the increasing difficulties of the higher education sector in Nigeria (Ogunleye & Adeyemi, 2019). Furthermore, the incorporation of AI in the recruitment procedure coincides with the broader trend of digital transformation in higher education, which is necessary for sustaining competitiveness in a fast-changing global educational architecture. Nigerian Universities, like their counterparts globally, should progressively adopt digital technologies to boost their operations and service delivery. The introduction of AI into their recruitment processes have positioned them at the forefront of digital revolution which is important for attracting and maintaining top talents in a very competitive market. This intentional deployment of AI does not only boost staff efficiency but also strengthens the University's reputation as a forward-thinking institution, which is crucial for attracting students, faculty and research findings (Ezeani & Onuoha, 2023).

AI represents a paradigm shift in the recruitment and selection procedures in Nigerian Universities, giving a range of benefits that contribute to better staff efficiency. By automating routine operations, minimising biases, delivering data-driven insights and integrating with the broader digital transformation agenda, AI enables institutions to attract and retain the most qualified and skilled staff. This, in turn, has a favourable impact on the overall efficacy and competitiveness of these institutions in the higher education sector. As Nigerian Universities continue to traverse the challenges of the 21st century, the strategic integration of AI into their

human resource practices will be important for accomplishing their academic and administrative goals.

Artificial Intelligence as a Digital tool for Enhancing Staff Development Programmes for Staff Productivity

Artificial Intelligence (AI) will profoundly impact staff development programmes in Nigerian Universities, particularly in boosting staff productivity. These programmes are vital for preparing personnel with the requisite skills and knowledge to adapt to the evolving needs of the educational sector. AI-driven solutions have aided in transforming the methods staff development programmes are developed, delivered, and assessed; ultimately encouraging a culture of continuous learning process and professional progress. Integrating AI into staff development programmes is beneficial because it has the ability to tailor learning experiences. AI algorithms have the ability to assess data on individual staff performance, learning preferences and career objectives thus enabling an environment of individualized training. This individualised approach guarantees staff members to receive targeted training which addresses their specific needs, resulting in more effective learning outcomes and better productivity. Accordingly, Adeoye (2022), emphatically stressed that, AI can identify gaps in a staff member's skill set and offer related courses or training sessions thereby expediting the learning process and minimising the time required for skill acquisition. It was reiterated that, AI supports the continual assessment of staff development programmes, delivering real-time feedback to both participants and administrators. This feedback loop enables an instant change of training material and methodology hence ensuring that the programmes remain current and effective. Also, AI-powered analytics can analyse the success of staff members over time, finding trends and projecting future training needs. This proactive approach to staff development does not only enhance individual performance but also contributes to the overall productivity of the institution (Okafor & Ojo, 2023).

Furthermore, AI provides more efficient staff development initiatives by accessing data on the efficiency of different training techniques and materials. AI can readily assist administrators optimize the use of available resources thus ensuring that investments in staff development reap optimal returns. This efficiency is particularly critical in Nigerian Universities, where funding constraints curtail the scope of staff development activities. AI's capacity to prioritize training needs based on data-driven insights allow institutions to spend their resources on the most impactful programmes, hence boosting staff productivity (Adetayo, 2021).AI also plays a

crucial role in facilitating collaboration and knowledge exchange among staff members through AI-powered platforms where workers simply access and share resources and participate in online discussions and collaborate on projects. This enhanced collaboration does not only enrich the learning experience of staff but also develop a sense of community and shared purpose among staff members which is vital to increasing productivity. In corroboration, Ibrahim (2022), asserted that, AI can facilitate mentorship programmes by linking less experienced personnel with mentors who hold the required skills, thus enhancing professional development and productivity. The inclusion of AI into staff development programmes in Nigerian Universities would retool how these programmes are delivered as they are made to be more personalized, efficient, and collaborative. By harnessing AI's capabilities in staff development programmes, Universities are sure of having versatile staff who will be well-equipped to tackle herculean tasks in 21st Century learning and research environments, ultimately leading to higher productivity and institutional success.

Artificial Intelligence as a Digital Tool for Enhancing Staff Appraisal for Staff Productivity

Staff appraisal refers to staff evaluation. It is a force to reckon with in the human resource cycle because the process informs human resource managers on the strengths and weaknesses of staff so as to know those to be promoted, trained or developed. Hence playing a crucial role in promoting productivity in organizations especially Nigerian Universities. The introduction of Artificial Intelligence (AI) has caused a paradigm shift on how staff assessments are handled, moving away from out-of-date, manual processes to more dynamic, data-driven alternatives. This transition carries enormous implications, one of which is boosting staff efficiency since AI technologies offer the capacity to improve and customise the evaluation process in ways that were previously unattainable.

In the traditional approach of staff appraisal, evaluations are often conducted periodically, either annually or within a duration of three (3) years which is mainly on subjective judgments by supervisors and managers. This approach while frequently used, has several disadvantages. It can be prone to biases, lacks real-time feedback and often fails to capture the entire scope of an employee's accomplishments over time. Moreover, the manual nature of these appraisals can make them cumbersome, time-consuming, and inconsistent, resulting to unhappiness among workers and inefficiencies in performance management (Obisi, 2020). Conversely, the integration of AI into staff appraisal systems addressed several of these concerns. AI-driven evaluation systems employ modern algorithms and machine learning techniques to examine a

huge array of data points, thus delivering a more comprehensive and impartial assessment of staff performance. These systems continuously monitor multiple performance indicators which include: work completion rates, peer reviews and even engagement levels thus providing a holistic perspective of an employee's contributions. This continuous feedback loop allows for real-time modifications to be made whereby in the work environment personnel are more aware of their performance and could take proactive efforts to enhance it (PwC, 2023).

There is an advantage worthy of note in the application of AI in staff appraisal. This is its ability to decrease biases and promote objectivity. Traditional assessments often suffer from flaws like recency bias, where recent performance disproportionately influences the entire judgement, or halo effects, where one positive or negative attribute overshadows other elements of performance. AI systems, in contrast, can process performance data over extended periods and across various dimensions, decreasing the impact of such biases and guaranteeing that appraisals are more equitable and accurate (Deloitte, 2021). This neutrality is vital in Nigerian Universities where different faculty and administrative staff demand free, fair and open evaluatory methods to sustain motivation and productivity. Similarly, AI-enabled assessments can be adapted to the specific demands and goals of individual employees. Personalized appraisal frameworks can be designed, taking into cognizance the specific tasks, responsibilities and career objectives of each staff. This personalisation enables for more relevant feedback and development opportunities, linking staff aims with the broader objectives of the University. For example, a professor may obtain AI-driven insights on how their research output compares with colleagues in related fields, or how their teaching approaches effect student engagement, allowing them to focus on areas that will most boost their productivity and career growth (Khan, Riaz & Ali, 2021).AI also boosts the scalability and efficiency of the appraisal process. In big institutions like Universities, performing detailed appraisals for every staff can be a challenging process. AI systems can manage huge volumes of data and generate insights with speed and accuracy, enabling human resource departments to conduct appraisals more regularly and with less administrative burden. This increased frequency of assessments ensures that, performance difficulties are discovered and handled soon, rather than waiting for an annual review cycle, which can be too late to alter any course successfully (Jiang, Koo & Wang, 2019). Moreover, AI's predictive analytics capabilities can also play a vital role in anticipating future performance and spotting potential difficulties before they exist. By evaluating trends in performance data, AI can identify which individuals are at risk of burnout which might be ready for leadership roles or which teams may require additional help to accomplish their targets. This foresight

allows the University management to take proactive measures such as providing additional training or resources to guarantee that staff productivity remains high (PwC, 2022). In relation to Nigerian Universities where the learning environment is fast being innovative and there is a rising demand to increase academic standards, the integration of AI in staff appraisal systems can be a game-changer. By giving more accurate, impartial, and timely appraisals, AI could help to guarantee that, personnel are not only meeting their current tasks but are also developing in ways that contribute to the long-term success of the University system. This, in turn, generates a culture of continual improvement where personnel are motivated to strive for excellence, knowing that their achievements will be properly and appropriately rewarded. The application of AI in staff appraisal in Nigerian Universities represent a significant development in the management of human resources. By overcoming the constraints of traditional appraisal methods, AI promotes objectivity, efficiency and personalization in performance evaluations which culminates in the promotion of staff productivity as well as contributes to a more motivated, engaged and capable workforce, vital for the continuous success and competitiveness of Nigerian Universities in the global educational scene.

Staff Remuneration for Staff Productivity

Staff remuneration plays an important part in boosting productivity in organisations and Nigerian Universities are not an exception. The integration of artificial intelligence (AI) in the human resource cycle projects, mark a fundamental shift in managing remuneration which directly affects staff productivity. Effective remuneration plans are critical, not just for attracting and keeping talents, but are also for encouraging personnel to reach better levels of performance and dedication to company goals (Aguinis, 2019). In conventional contexts, staff remuneration in Nigerian Universities often follow rigid frameworks, typically connected to qualifications, years of experience and job grades. While these systems provide equity and openness, they can fail to reflect individual contributions effectively, resulting in potential discrepancies between performance and rewards (Gohari, Ahmadloo, Boroujeni & Hosseinipour, 2019). AI offers a solution to this problem by providing more dynamic and individualised remunerative system by accessing data related to staff performance such as teaching efficacy, research output and administrative role. AI-driven systems can adapt compensation to reflect individual contributions more effectively (Kaplan & Haenlein, 2020). This performance-based approach ensures that people who significantly contribute to the University's success are rewarded appropriately, therefore establishing a culture of excellence and encouraging higher productivity (Kiron, 2021).

Additionally, AI boosts the transparency and effectiveness of payment procedures. Traditional methods of payment are frequently time-consuming and prone to human errors and prejudices. AI systems can process and evaluate vast volumes of data fast, ensuring that remuneration decisions are both fair and data-driven (Bhardwaj, Singh & Sharma, 2020). The afore mentioned statement denotes that, AI tools have the ability to decrease administrative load on human resource departments as well as promote trust among personnel, since it is certain that the compensation of employees is chosen by objective criteria rather than subjective judgments (Fountaine, McCarthy & Saleh, 2019).

The impact of AI on payment extends beyond setting pay scales. It offers predictive analytics that can foresee future remuneration demands based on trends in staff performance and market conditions. This allows colleges to remain competitive in attracting top talents while ensuring that their remuneration policies are sustainable on the long run (Brynjolfsson & McAfee, 2017). It was assertively argued that, AI can uncover potential discrepancies in remuneration across different groups, enabling institutions to resolve any injustice proactively and promote a more inclusive work environment (Tambe, Cappelli & Yakubovich, 2019).

Probing further without much equivocation, unravelled that utilising AI's function in retooling staff compensation could serve as a major driver in improving productivity in Universities in Nigeria which can be achieved by matching remuneration more closely with individual performance and contributions. AI is known to inspire staff to thrive and ensures that universities can attract and retain the greatest personnel in a competitive academic setting (Kaplan & Haenlein, 2020). Thus, the integration of AI in human resource cycle operations presents a paradigm shift that has the potential to greatly boost staff productivity and by extension the overall efficacy of Nigerian Universities.

The Nexus Between Utilisation of Artificial Intelligence and Human Resource Cycle Operations for Staff Productivity

It is imperative to look into the causal link between staff productivity and the use of artificial intelligence (AI) in HR cycle operations which stem from recruitment to staff productivity, particularly in Nigerian Universities' setting. The integration of artificial intelligence (AI) in the Universities have the potential to improve productivity in human resource management as noticeable among other fields where it is becoming a more disruptive force. By automating repetitive processes, artificial intelligence (AI) technologies like machine learning algorithms and natural language processing greatly increase the productivity of HR

operations. There is no gainsaying that, AI-driven technologies can expedite hiring procedures by sorting through a lot of applications and finding qualified applicants faster than using conventional techniques (Chen, Li & Yu,2020). According to Khan, Riaz and Ali (2021), automation minimises human biases and also cuts down on time and resources spent on hiring, resulting in more impartial and equal hiring processes. Consequently, HR departments are able to focus their resources on more strategic tasks which may result in an institution-wide productivity. All of these point to the fact that, when AI tools are employed in servicing human resource cycle projects, the Universities in Nigeria would record a high productivity rate amongst staff. AI improves staff efficiency through sophisticated performance management systems in addition to recruitment (Adeniji & Osinbanjo, 2022). AI-driven analytics systems are able to track workers performance in real time, giving feedback and pinpointing areas that need to be improved upon (Jiang, Koo & Yakubovich, 2019). Additionally, AI digital technologies are able to swiftly address performance issues because of the continuous feedback loop which promotes an environment of continual development and progress. According to Davenport, Guenole, and Malhotra (2020), the capacity to customise training and development initiatives based on data-driven insights guarantee that, resources are distributed wisely by meeting the needs of each worker and encouraging increased productivity.

AI is also known to make human resource planning and management more efficient by forecasting future personnel requirements and allocating resources optimally. HR departments can foresee and rectify possible skill gaps before they have an impact on productivity by using predictive analytics, which can analyse past data and estimate future patterns (Baryshnikova,2022). AI has a part in both staff retention and engagement. Artificial intelligence (AI) powered engagement solutions are able to assess employee sentiment and engagement levels, giving insights into variables influencing morale and output (Gupta, Jain & Gupta,2021). Universities can lower turnover rates and increase staff satisfaction by implementing targeted interventions early enough by recognising patterns and possible difficulties. In the view of Schaufeli and Bakker (2019), since engaged workers are more likely to be driven and devoted to their jobs, high levels of employee engagement are strongly correlated with higher production. Therefore, the need for staff engagement should be prioritized.AI can also completely transform HR analytics by offering more in-depth understanding of staff dynamics. In the same vein Universities could make better informed decisions by using advanced data analytics to perform thorough studies of employee performance, remuneration and career advancement (Cascio & Montealegre, 2016). By using

these insights, Universities can further improve productivity by creating HR strategies and policies that are more productive and in line with institutional objectives.

Conclusion

With little resources and high employee turnover rates occasioned by brain drain to developed countries, Nigerian Universities are faced with peculiar challenges. However, integrating AI into human resource cycle projects has the potential to significantly increase productivity and efficiency. Therefore, AI technologies should be seen as energy and time saving useful tools for use in boosting staff recruitment, selection, engagement, performance appraisal, training, development and remuneration processes while increasing staff productivity in Nigerian Universities in the present and future.

Suggestions

The following suggestions were made based on the discourse.

1. Funding for Universities should be prioritized so that artificial intelligence tools could be incorporated into the Human Resource Departments for better human resource cycle projects such as recruitment, selection, performance appraisal, training and development and remuneration.

2. Artificial Intelligence tools should be used for staff recruitment and selection so as to get the most qualified personnel to manage University education for an enhanced productivity.

3. Staff training and development should be AI powered in order to individualize the process for productivity.

4. Performance appraisal of staff should be AI powered as this would wholesomely appraise staff without bias thereby promoting objectivity as it has the ability to process performance data over extended periods and across various dimensions.

5. Remuneration of staff should be done by AI powered tools for an encompassing process that would lead to staff productivity and retention in the Universities. This is because AI driven systems readily adapt remuneration to reflect individual contributions more effectively.

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Gender and AI: Exploring the Intersection of Technology and Social Change

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Abstract

The paper explored the intersection of gender and artificial intelligence (AI), examining how these dynamic shapes both technological development and societal transformation. It delved into the following key areas. Gender Bias in AI. The study analyzed how existing gender biases in data sets and algorithms can perpetuate and amplify societal inequalities within AI systems. It examined the implications of biased AI in areas like hiring, loan approvals, and criminal justice, highlighting the need for diverse perspectives and inclusive design principles. Women's Representation in AI. It examines the underrepresentation of women in AI research, development, and leadership roles. It explored the factors contributing to this disparity, including gender stereotypes, lack of mentorship, and systemic barriers. It also examined the impact of this underrepresentation on the development and deployment of AI technologies. AI's Potential for Gender Equality. The abstract explored the potential of AI to promote gender equality by addressing existing societal challenges. It examined how AI can be used to combat gender-based violence, improve access to education and healthcare, and empower women in the workforce. Ethical Considerations. The study discussed the ethical implications of AI development and deployment in relation to gender. It explored issues such as privacy, surveillance, and the potential for AI to exacerbate existing power imbalances. It emphasizes the need for ethical frameworks and regulations to ensure that AI technologies are developed and used responsibly. Future Directions. The study suggests, by outlining key areas for future research and action. It called for increased efforts to address gender bias in AI, promote women's participation in the field, and ensure that AI technologies are developed and deployed in a way that benefits all members of society.

Keywords. Gender, Artificial intelligence, Exploring, Intersection, Technology, Social changes

Introduction

Gender and Artificial intelligence (AI) have become increasingly intertwined in recent years, as advancements in technology have allowed for the development of more sophisticated artificial intelligence systems. These systems are often trained on large datasets that may contain biases related to gender, leading to potential issues of discrimination and inequality. Buolamwini & Gebru. (2018). One area where the intersection of gender and AI is particularly pronounced is in social media platforms. These platforms use AI algorithms to

curate content, target advertisements, and moderate user behavior. However, these algorithms can perpetuate gender stereotypes and biases, leading to unequal treatment of users based on their gender. For example, studies have shown that AI algorithms on social media platforms may prioritize content from male users over female users, or may show ads for high-paying jobs more frequently to male users than to female users. Noble. (2018). This can reinforce existing gender disparities in the workforce and limit opportunities for women. Crawford & Calo. (2016).

Additionally, AI algorithms used for content moderation on social media platforms may struggle to accurately identify and address issues related to gender-based harassment and abuse. This can create a hostile environment for marginalized groups, including women, on these platforms. To address these issues, it is important for developers and designers of AI systems to be mindful of the potential biases that can be present in their algorithms.

This may involve conducting thorough audits of training data, implementing diversity and inclusion initiatives within development teams, and regularly monitoring and evaluating the impact of AI systems on different gender groups. the intersection of gender and AI in social media presents both challenges and opportunities for creating more inclusive and equitable online spaces. By recognizing and addressing biases in AI systems, we can work towards a more fair and just digital landscape for all users. Diakopoulos, (2016). One key gap in the intersection of gender and AI in social media is the lack of diverse representation in the development and implementation of AI systems. Research has shown that AI algorithms can reflect the biases and perspectives of their creators, leading to potential discrimination against marginalized groups, including women. To address this gap, it is crucial to increase diversity within the tech industry, particularly in roles related to AI development and data science. By including more women and individuals from diverse backgrounds in the design and implementation of AI systems, we can help mitigate biases and ensure that these technologies are more inclusive and equitable for all users.

Additionally, there is a need for more research and analysis on the specific ways in which gender biases manifest in AI algorithms on social media platforms. This includes studying the impact of algorithmic decision-making on different gender groups, as well as developing tools and methodologies to detect and address biases in AI systems. Overall, addressing the gap in gender and AI in social media requires a multi-faceted approach that involves increasing diversity in the tech industry, conducting thorough research on biases in AI algorithms, and

implementing strategies to promote fairness and inclusivity in the development and deployment of AI systems. Artificial intelligence (AI) has the potential to facilitate significant technological and social change in the realm of gender equality. D'Ignazio & Klein (2020). By leveraging AI technologies, organizations and policymakers can address gender disparities, promote diversity and inclusion, and empower individuals of all genders. In this essay, we will explore how AI is being used to drive positive change in gender equality, as well as the challenges and opportunities that come with integrating AI into efforts to promote gender equity. One of the key ways in which AI is facilitating technology and social change in gender is through the development of gender-inclusive algorithms and systems. AI algorithms are often trained on large datasets that may contain biases related to gender, race, or other demographic factors. Eubanks, (2018). These biases can lead to discriminatory outcomes, such as gender-based discrimination in hiring practices or biased decision-making in criminal justice systems.

By developing algorithms that are designed to be gender-inclusive and free from bias, organizations can ensure that AI technologies promote fairness and equality for individuals of all genders. For example, AI-powered recruitment platforms can help organizations identify and eliminate biases in their hiring processes by analyzing job descriptions, screening resumes, and evaluating candidates based on their skills and qualifications rather than their gender. Wachter-Boettcher, S. (2017). By using AI to remove bias from the recruitment process, organizations can create more diverse and inclusive workforces that reflect the full spectrum of gender identities. AI technologies can also be used to address gender-based violence and discrimination. For instance, AI-powered chatbots and virtual assistants can provide support and resources to individuals experiencing domestic violence or harassment. These tools can offer information on legal rights, safety planning, and available support services, empowering survivors to seek help and access the resources they need to escape abusive situations. Benjamin (2019). In addition to addressing gender disparities and promoting gender equality, AI can also help to amplify the voices of marginalized communities and promote representation in media and entertainment. AI-powered content recommendation systems can help users discover diverse and inclusive content that reflects a wide range of gender identities and experiences. By using AI to promote diverse representation in media, organizations can challenge stereotypes and promote positive portrayals of individuals of all genders.

Furthermore, AI technologies can be used to advance research on gender issues and inform evidence-based policymaking. O'Neil (2016). By analyzing large datasets and identifying

patterns and trends related to gender disparities, researchers and policymakers can develop targeted interventions and policies to address systemic inequalities. AI can help to identify areas where gender disparities exist, such as in healthcare, education, or employment, and provide insights into the root causes of these disparities.

Despite the potential benefits of AI in promoting gender equality, there are also challenges and risks associated with the use of AI technologies in this context. One of the key challenges is the potential for AI algorithms to perpetuate existing biases and discrimination. If AI systems are trained on biased data or programmed with biased assumptions, they may produce discriminatory outcomes that reinforce existing inequalities. Barocas. Hardt & Narayanan. (2019). For example, AI-powered facial recognition systems have been found to exhibit racial and gender biases, leading to inaccurate and discriminatory results for individuals of certain racial or gender identities. To address these challenges, organizations must prioritize diversity and inclusion in the development and deployment of AI technologies, ensuring that diverse perspectives are represented in the design and implementation of AI systems. Another challenge is the potential for AI technologies to exacerbate existing power imbalances and inequalities. Buolamwini & Raji. (2018). As AI becomes increasingly integrated into various aspects of society, there is a risk that individuals and communities with access to AI technologies will benefit disproportionately, while marginalized groups may be further marginalized. Noble. (2019). To mitigate these risks, organizations must ensure that AI technologies are developed and deployed in a way that promotes equity and inclusivity for individuals of all genders. AI has the potential to facilitate significant technological and social change in gender by addressing disparities, promoting diversity and inclusion, and empowering individuals of all genders. Dastin (2020). By developing gender-inclusive algorithms, addressing gender-based violence, promoting representation in media, and advancing research on gender issues, AI can help to create a more equitable and inclusive society for individuals of all genders. However, to realize the full potential of AI in promoting gender equality, organizations and policymakers must address the challenges and risks associated with the use of AI technologies and prioritize diversity and inclusion in the development and deployment of AI systems. By harnessing the power of AI for social good, we can work towards a more just and equitable future for individuals of all genders.

The Overview of Genders

The concept of gender refers to the socially constructed roles, behaviors, activities, and attributes that a particular society considers appropriate for men and women. Gender is distinct from biological sex, which is based on physical characteristics such as chromosomes, hormones, and reproductive organs. Gender is a complex and multifaceted concept that can encompass a wide range of identities beyond the traditional binary categories of male and female. Diakopoulos. (2016). This includes non-binary, genderqueer, genderfluid, and other gender identities that do not conform to the traditional male-female dichotomy.

Gender is also influenced by cultural, social, and historical factors, and can vary significantly across different societies and time periods. Gender norms and expectations can shape individuals' experiences, opportunities, and interactions in various aspects of life, including education, work, relationships, and social interactions. Eubanks. (2018). It is important to recognize that gender is not a fixed or innate characteristic, but rather a dynamic and fluid aspect of identity that can be influenced by a variety of factors. Understanding and challenging traditional gender norms and stereotypes is essential for promoting gender equality, diversity, and inclusivity in society.

Gender bias in artificial intelligence (AI) systems is a significant concern that has been increasingly recognized in recent years. Here are some key facts about gender and AI:

1. Gender bias in AI algorithms: AI systems can reflect and perpetuate existing societal biases, including gender biases. For example, AI algorithms trained on biased data sets may produce biased outcomes, such as favoring male candidates in job recruitment or recommending higher-paying jobs to men over women.

2. Gendered language in AI: Some AI systems use language models trained on large data sets of text, which can inadvertently perpetuate gender stereotypes and biases. For example, language models may associate certain professions or roles with specific genders, reinforcing traditional gender norms.

3. Lack of diversity in AI development: The lack of diversity in the tech industry, including gender diversity, can contribute to the development of biased AI systems. A more diverse workforce can help identify and address potential biases in AI algorithms and ensure that AI technologies are inclusive and equitable.

4. Gender-based violence and AI: AI technologies, such as facial recognition and predictive policing systems, have been criticized for their potential to perpetuate gender-based violence and discrimination. For example, biased AI algorithms may disproportionately target marginalized communities, including women and gender minorities.

5. Addressing gender bias in AI: Efforts are underway to address gender bias in AI, including developing guidelines and standards for ethical AI development, increasing diversity in the tech industry, and promoting transparency and accountability in AI systems. It is essential to prioritize diversity, equity, and inclusion in AI development to ensure that AI technologies benefit all members of society.

The concept of AI

Artificial intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think and act like humans. AI technologies enable machines to perform tasks that typically require human intelligence, such as visual perception, speech recognition, decision-making, and language translation. AI systems can analyze large amounts of data, identify patterns, and make predictions or decisions based on that data. Friedler. Scheidegger & Venkatasubramanian (2019] There are different types of AI, including narrow AI (also known as weak AI), which is designed for specific tasks, and general AI (also known as strong AI), which aims to replicate human intelligence across a wide range of tasks. Machine learning, a subset of AI, involves training algorithms to learn from data and improve their performance over time without being explicitly programmed.

AI technologies have a wide range of applications across various industries, including healthcare, finance, transportation, and entertainment. Kofman & Ravi. (2019). Some common examples of AI applications include virtual assistants (e.g., Siri, Alexa), recommendation systems (e.g., Netflix, Amazon), autonomous vehicles, and medical diagnosis systems. As AI continues to advance, there are ongoing discussions and debates about the ethical implications of AI technologies, including concerns about bias, privacy, job displacement, and the potential for AI to outperform human intelligence. It is essential for developers, policymakers, and society as a whole to consider the ethical and societal implications of AI and ensure that AI technologies are developed and deployed responsibly.

The conceptual review of technology and social change

Technology and social media have become powerful tools for shaping and influencing societal norms and behaviors, including those related to gender. In recent years, there has been a growing awareness of the impact of technology and social media on gender equality, as well as the potential for these platforms to both perpetuate and challenge traditional gender stereotypes and norms. In this essay, we will explore how technology and social media are shaping perceptions of gender, influencing social change, and creating new opportunities for individuals of all genders. Raji & Buolamwini, J. (2019). One of the ways in which technology and social media are impacting gender is through the representation of gender identities and expressions. Social media platforms such as Instagram, Tikor, and YouTube have provided individuals with a space to express themselves and share their experiences, including those related to gender identity and expression. These platforms have enabled individuals to challenge traditional gender norms and stereotypes, and to explore and celebrate diverse gender identities.

For example, influencers and content creators on social media have used their platforms to raise awareness of issues related to gender equality, promote body positivity, and advocate for rights. By sharing their stories and experiences, these individuals have helped to create a more inclusive and accepting online community that celebrates diversity and empowers individuals of all genders to express themselves authentically. O'Neil. (2016) Technology has also played a role in advancing gender equality through the development of tools and resources that support individuals in challenging gender-based discrimination and violence. For instance, there are a number of apps and online platforms that provide information and resources for individuals experiencing domestic violence, sexual harassment, or discrimination based on gender.

These tools can help individuals access support services, connect with advocates, and take steps to protect themselves and seek justice. In addition to providing support for individuals experiencing gender-based discrimination, technology and social media have also been used to raise awareness of gender issues and mobilize communities to take action. Social media campaigns, hashtags, and online petitions have been instrumental in raising awareness of issues such as gender pay equity, reproductive rights, and gender-based violence.

These campaigns have helped to amplify the voices of marginalized communities, challenge stereotypes, and advocate for policy changes that promote gender equality. technology has created new opportunities for individuals of all genders to access education, employment, and economic opportunities. Online learning platforms, remote work opportunities, and digital

skills training programs have enabled individuals to access education and job opportunities regardless of their gender or geographic location. Wachter-Boettcher, S. (2017). These technologies have the potential to empower individuals to pursue their goals and aspirations, regardless of traditional gender roles or expectations. Despite the positive impact of technology and social media on gender equality, there are also challenges and risks associated with the use of these platforms. One of the key challenges is the potential for technology and social media to perpetuate harmful gender stereotypes and biases. For example, algorithms used by social media platforms and search engines may prioritize content that reinforces traditional gender norms, leading to the marginalization of diverse gender identities and expressions. Additionally, technology and social media can be used as tools for harassment, cyberbullying, and online abuse, particularly targeting individuals who challenge traditional gender norms or advocate for gender equality. Women, LGBTQ+ individuals, and gender non-conforming individuals are often disproportionately targeted for online harassment and abuse, which can have serious consequences for their mental health and well-being. To address these challenges and promote gender equality in the digital age, it is essential for technology companies, policymakers, and users to prioritize diversity, inclusion, and safety in the design and implementation of technology and social media platforms. This includes developing algorithms that are free from bias, implementing robust policies and mechanisms to address online harassment and abuse, and promoting digital literacy and online safety education for users of all ages. technology and social media have the potential to shape perceptions of gender, influence social change, and create new opportunities for individuals of all genders. By providing a platform for individuals to express themselves, challenge stereotypes, and advocate for gender equality, technology and social media can play a critical role in advancing gender equality and empowering individuals to live authentically and freely. However, to realize the full potential of technology and social media in promoting gender equality, it is essential to address the challenges and risks associated with these platforms and prioritize diversity, inclusion, and safety in all aspects of technology development and implementation. By working together to create a more inclusive and equitable digital world, we can build a future where individuals of all genders can thrive and succeed.

Challenges and limitation

Artificial intelligence (AI) has the potential to revolutionize industries, improve efficiency, and enhance decision-making processes. However, the use of AI also presents challenges and limitations when it comes to gender equality and representation. In this research, we will

explore some of the key challenges and limitations of gender and AI, and discuss potential strategies for addressing these issues.

[1] One of the primary challenges of gender and AI is the potential for bias in AI algorithms. AI systems are trained on large datasets, which may contain biases and stereotypes related to gender. These biases can manifest in various ways, such as in the form of gendered language, discriminatory decision-making processes, or unequal opportunities for individuals of different genders. AI algorithms used in hiring processes may inadvertently discriminate against women or individuals from marginalized gender groups by favoring male candidates or perpetuating gender stereotypes. Similarly, AI systems used in criminal justice systems may exhibit bias against women or individuals of colour, leading to unfair outcomes and perpetuating systemic inequalities.

[2] Another challenge of gender and AI is the lack of diversity in the development and deployment of AI technologies. The tech industry is predominantly male-dominated, which can result in a lack of diverse perspectives and experiences in the design and implementation of AI systems. This lack of diversity can lead to the development of AI technologies that do not adequately address the needs and concerns of individuals of all genders. Furthermore, the underrepresentation of women and individuals from marginalized gender groups in the tech industry can perpetuate existing gender disparities in access to opportunities and resources. This lack of diversity can also contribute to the perpetuation of gender stereotypes and biases in AI technologies, further exacerbating inequalities and hindering progress towards gender equality.

[3] In addition to bias and lack of diversity, another limitation of gender and AI is the potential for AI technologies to reinforce and perpetuate harmful gender stereotypes. AI systems are often trained on historical data, which may reflect and perpetuate existing gender norms and stereotypes. This can result in AI technologies that reinforce traditional gender roles, limit opportunities for individuals of all genders, and perpetuate harmful societal norms. For example, AI chatbots and virtual assistants are often designed with female voices and personalities, reinforcing the stereotype that women are more suited for caregiving and administrative roles. Similarly, AI algorithms used in marketing and advertising may target individuals based on gender stereotypes, perpetuating harmful beauty standards or reinforcing gendered expectations.

How to Address these Challenges

To address the challenges and limitations of gender and AI, it is essential to prioritize diversity, equity, and inclusion in the development and deployment of AI technologies. This includes ensuring diverse representation in AI development teams, incorporating ethical considerations into AI design processes, and implementing mechanisms to detect and mitigate bias in AI algorithms. One potential strategy for addressing bias in AI algorithms is the use of algorithmic auditing and transparency measures. Algorithmic auditing involves evaluating AI systems for bias, discrimination, and fairness, and implementing measures to address any identified issues. Transparency measures involve making AI algorithms and decision-making processes more transparent and accountable to users and stakeholders.

Another strategy for promoting gender equality in AI is the development of inclusive and diverse datasets. By ensuring that AI systems are trained on diverse and representative datasets, developers can help to mitigate bias and ensure that AI technologies are inclusive and equitable for individuals of all genders.

Furthermore, it is essential to engage with stakeholders from diverse backgrounds, including women, individuals from marginalized gender groups, and experts in gender studies, to ensure that AI technologies are developed in a way that promotes gender equality and addresses the needs and concerns of all individuals, the challenges and limitations of gender and AI highlight the importance of prioritizing diversity, equity, and inclusion in the development and deployment of AI technologies. By addressing bias, lack of diversity, and harmful stereotypes in AI systems, we can work towards creating a more inclusive and equitable digital future that promotes gender equality and empowers individuals of all genders to thrive and succeed.

Conclusion

The intersection of gender and AI presents both opportunities and challenges for social change. While AI has the potential to empower women and promote gender equality, it also risks exacerbating existing inequalities if not developed and deployed responsibly. Bias is a real concern. AI systems are only as good as the data they are trained on, and this data often reflects existing societal biases. This can lead to discriminatory outcomes, particularly for women.

AI can be a force for good. AI can be used to develop tools and solutions that address gender-based violence, improve access to education and healthcare, and empower women in leadership roles.

Collaboration is crucial. Addressing the challenges of gender and AI requires collaboration between researchers, developers, policymakers, and civil society organizations.

Promote diversity in AI. Encourage more women and underrepresented groups to pursue careers in AI to ensure a more diverse and inclusive field.

Develop ethical guidelines. Establish clear ethical guidelines for AI development that address gender bias and promote social justice.

Invest in research and innovation. Support research and development of AI technologies that specifically address gender equality and empower women.

By acknowledging the potential risks and opportunities, and by working together to ensure responsible development and deployment, we can harness the power of AI to create a more equitable and just future for all genders.

Suggestions

Gender Bias in AI. Analyze how gender biases are embedded in AI algorithms and datasets, leading to discriminatory outcomes in areas like hiring, loan approvals, and facial recognition.

[2] Impact of AI on Women's Work. Investigate how AI is transforming traditional female-dominated industries and its implications for women's employment, wages, and career opportunities.

[3] AI for Gender Equality. Explore how AI can be used to promote gender equality, such as developing tools for combating gender-based violence, improving access to education and healthcare, and empowering women in leadership roles.

[4] Developing AI tools for gender-sensitive design. Create AI-powered tools that help designers and developers build products and services that are inclusive and equitable for all genders.

[5] Promoting diversity in AI research and development. Encourage more women and underrepresented groups to pursue careers in AI by providing mentorship, scholarships, and networking opportunities.

[6] Ethical guidelines for AI development. Advocate for the development and implementation of ethical guidelines for AI development that address gender bias and promote social justice.

[7] Public awareness campaigns. Raise awareness about the potential impact of AI on gender equality and encourage public discourse on these issues.

[8] Policy recommendations. Advocate for policies that promote responsible AI development and address the potential risks of gender bias and discrimination.

[9] Collaboration with stakeholders. Engage with policymakers, industry leaders, and civil society organizations to develop solutions that address the intersection of gender and AI.

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Curriculum Management in Nigerian Secondary School for Sustainable Development: Challenges and Opportunities

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Abstract

Curriculum management in Nigerian Secondary schools is pivotal for advancing sustainable development goals (SDGs). Effective curriculum management encompasses the design, implementation, and periodic review of educational programmes to ensure they meet current and future needs. Despite significant efforts, numerous challenges persist, including inadequate infrastructure, insufficient teacher training, and outdated educational policies. Addressing these issues presents opportunities for reform, such as integrating modern pedagogical approaches and aligning curricula with global sustainability standards. By focusing on these areas, Nigerian secondary schools can enhance educational quality and better contribute to sustainable development. This theoretical explores the complexities of curriculum management in the context of Nigerian secondary education, highlighting both the obstacles and potential solutions for fostering a more Robust and responsive educational system.

Keywords: Curriculum implementation, Curriculum management, Curriculum review, Education opportunities, Education policy, Education reform, Equality education, Sustainable development.

Introduction

Nigeria's education sector, particularly the secondary school level, is critical to the nation's socio-economic development. The effectiveness of this sector is largely dependent on the strength and adaptability of its curriculum management processes. Effective curriculum management ensures that educational programs are not only comprehensive but also aligned with both national and global development goals (Ogunyemi, 2015). In recent years, the global agenda has increasingly emphasized sustainable development, as exemplified by the United Nations' Sustainable Development Goals (SDGs). These goals underscore the need for educational reforms that are both sustainable and adaptable to evolving global needs within this context, Okebukola, (2009) claim that the Nigerian secondary school curriculum must be meticulously managed and continuously reviewed to ensure it contributes to sustainable national development. The Sustainable Development Goals (SDGs) provide a universal

framework for addressing global challenges, including those related to education. SDG 4, which according to United Nations (2015), focuses on ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all and emphasises the critical role of education in achieving sustainable development. Adebayo, (2019) is of the opinion that in Nigeria, where educational disparities and systemic challenges persist, aligning Secondary school curricula with the objectives of SDG 4 presents both significant challenges and potential opportunities. A curriculum managed with an emphasis on sustainable development principles can empower students with the knowledge, skills, and values necessary to contribute effectively to both national and global progress (Obanya, 2007). The paper seeks to explore the complex dynamics of curriculum management in Nigerian secondary schools, focusing particularly on how it can be leveraged to achieve sustainable development goals. By examining the challenges inherent in the current system and identifying potential opportunities for reform, this paper aims to provide a comprehensive analysis that can inform policymakers, educators, and other stakeholders. Through a detailed examination of curriculum management practices, educational policies, and the broader socio-political context, the paper offers insights into how Nigeria's secondary education system can be better aligned with sustainable development objectives.

Curriculum Management in Nigeria

Curriculum management involves the systematic planning, implementation, monitoring, and evaluation of educational programmes to ensure that learning objectives are achieved. It encompasses a range of activities, including curriculum design, content selection, instructional strategies, and assessment methods. In the context of secondary education, curriculum management is crucial for providing students with a well-rounded education that prepares them for higher education and the life of work. Effective curriculum management, according to Ajayi (2018), requires collaboration among various stakeholders, including policymakers, educators, administrators, and the community. It is not merely about the content taught in schools but also about how that content is delivered and assessed to meet the educational needs of students. In Nigeria, the complexity of curriculum management is heightened by the country's diverse socio-cultural landscape and the need to address both national development goals and global education standards.

The history of curriculum development in Nigeria is closely tied to the country's colonial past as posited by Fafunwa (2004) and subsequent efforts to reform its educational system to better meet local needs. The post-colonial era saw significant educational reforms aimed at

decolonizing the curriculum and aligning it with Nigeria's socio-economic realities. One of the major shifts, according to Nwagwu (2007) was the introduction of 6 years of primary education, 3years of junior secondary, 3years of senior secondary and 4years of tertiary education (6-3-3-4).

The 6-3-3-4 system of education, was designed to provide a more balanced and functional education that would produce graduates equipped with the skills necessary for national development. In-spite, of this, Okebukola (2011) opined that the implementation of these reforms has faced numerous challenges, including inadequate funding, poor infrastructure, and a lack of trained personnel. Despite these challenges, Adewale (2013) maintain that there have been ongoing efforts to review and update the curriculum to make it more relevant and responsive to the changing needs of society. The current focus on integrating sustainable development goals into the curriculum represents the latest phase in this ongoing process of curriculum reform.

Sustainable Development Goals (SDGs) and Nigerian Education.

Sustainable Development Goals (SDGs) are seventeen shared blueprints for peace and prosperity for people on the planets now and into the future. It represents a global commitment to addressing some of the most pressing challenges facing humanity, including poverty, inequality, and environmental degradation. United Nations (2015) singles out Education as central to achieving these goals, as it provides individuals with the knowledge, skills, and values needed to make informed decisions and contribute to society. Sustainable development goal 4 (SDG4) in particular, emphasizes the need for inclusive and equitable quality education and lifelong learning opportunities for all.

For us in Nigeria, achieving the targets set under the SDG 4, according to Amadi (2017), presents significant challenges, particularly in the areas of access to equity in and quality of education. The country's education system is characterised by significant disparities, with rural areas and marginalized groups often having limited access to quality education (Odukoya, 2016). Additionally, the quality of education is often compromised by inadequate infrastructure, insufficient teaching materials, and poorly trained teachers (Okebukola, 2011).

Integrating the principles of sustainable development into the secondary school curriculum is essential for achieving the objectives of the SDG 4 in Nigeria. This requires a holistic approach to curriculum design, where sustainability is not treated as a standalone subject but is integrated

across all areas of learning. For instance, environmental education can be embedded into science curricula, while social studies can focus on issues of equity and justice.

Several initiatives have been undertaken to promote the integration of SDGs into the Nigerian curriculum. These, as listed by Obanya, (2004) include the development of new teaching materials that emphasize sustainability, the training of teachers in SDG-related content, and the incorporation of global citizenship education into the curriculum. However, the success of these initiatives, according to Ololube (2012), depends on the ability of schools to implement them effectively, which in turn requires adequate support from government and other stakeholders.

Challenges in Curriculum Management for Sustainable Development

The challenges in curriculum management for sustainable development include:

1. **Policy and Governance Issues**

    One of the major challenges in curriculum management for sustainable development in Nigeria is the inconsistency in education policy formulation and implementation. Education policies in Nigeria are often influenced by political considerations rather than educational needs, leading to frequent changes in policy direction that disrupt curriculum implementation. Moreover, there is often a gap between policy formulation at the Federal level and implementation at the State and Local levels, resulting in inconsistencies in curriculum delivery across the country (Okojie, 2011). Political instability and corruption further exacerbate these challenges. The frequent changes in government often lead to changes in education policies, with each new administration seeking to implement its own agenda without regard for continuity or long-term planning (Odukoya, 2016). Corruption in the education sector also diverts resources away from essential areas such as curriculum development and teacher training, further undermining the quality of education.

2. **Resource Constraints**

    The effective management of the curriculum is also hampered by resource constraints, including inadequate funding, poor infrastructure, and a lack of teaching materials (Ekundayo, 2010). Many schools in Nigeria, particularly in rural areas, for Nwaka (2015), lack basic facilities such as classrooms, laboratories, and libraries, which are essential for effective teaching and learning. Additionally, the shortage of textbooks and

other teaching materials makes it difficult for teachers to deliver the curriculum effectively (Ajayi, 2018).

Funding for education in Nigeria is also inadequate, with the country consistently falling short of the UNESCO-recommended benchmark of allocating 15-20% of its national budget to education. This lack of funding affects all aspects of education, including curriculum development, teacher training, and the provision of learning materials (Adeyemi & Adu, 2012). Without sufficient resources, it is challenging to implement a curriculum that meets the demands of sustainable development.

3. **Teacher Training and Professional Development**

Ololube (2009) posits that another significant challenge in curriculum management for sustainable development is the inadequate training and professional development of teachers. Many teachers in Nigeria lack the necessary training to deliver a curriculum that is aligned with the principles of sustainable development. Aina (2013) agreeably expresses that this is particularly true in subjects such as science and social studies, where teachers need to be well-versed in issues related to sustainability. Corroborating, Ogunyemi (2015) opines that continuous professional development is also lacking, with many teachers not receiving regular updates on new teaching methods or curriculum changes. This lack of ongoing training, in the view of Babalola, (2015), means that teachers are often ill-prepared to implement new curriculum initiatives or to integrate sustainability into their teaching. Addressing this challenge requires a significant investment in teacher training and professional development programmes, as well as a commitment to ensuring that all teachers have access to the resources and support them need to succeed.

4. **Socio-cultural Barriers**

Socio-cultural factors also play a significant role in shaping curriculum management in Nigeria. Traditional beliefs and practices as exposed by Obanya (2014) can sometimes conflict with the principles of sustainable development, making it difficult to implement certain aspects of the curriculum. For example, in some regions, cultural norms regarding gender roles may hinder efforts to promote gender equality in education. Similarly, Dada (2004) maintains that religious beliefs can sometimes clash with scientific concepts, making it challenging to teach subjects such as evolution or climate change. Additionally, Nigeria's diverse cultural landscape means that there are

significant regional differences in how the curriculum is delivered and received. What works in one part of the country may not be effective in another, and this diversity needs to be taken into account in curriculum planning and implementation. Overcoming these socio-cultural barriers requires a nuanced approach that respects local traditions while also promoting the values of sustainability and global citizenship.

Opportunities for Curriculum Management Reform

Despite the challenges, there are significant opportunities for reforming curriculum management in Nigeria to better align with the goals of sustainable development.

1. **Policy Reforms for Sustainable Education**

   One of the key areas for reform for Edukugho (2012), is in education policy-making. To be effective, education policies need to be based on sound research and must be designed to be flexible enough to adapt to changing circumstances. This requires a commitment to evidence-based policy-making, as well as greater collaboration between policymakers, educators, and other stakeholders (Nwagwu, 2007). Fostering inter-sectoral collaboration is also essential for effective curriculum management. The involvement of various sectors, including health, agriculture, and environment, can help to create a more integrated and holistic curriculum that addresses all aspects of sustainable development. Additionally, partnerships with the private sector can provide valuable resources and expertise to support curriculum development and implementation (Obanya, 2004).

2. **Enhancing Teacher Capacity**

   Investing in teacher training and professional development is another critical area for reform. Teachers are at the forefront of curriculum delivery, and their ability to effectively implement the curriculum is essential for achieving sustainable development goals (Ololube, 2009). To enhance teacher capacity building, there need to be a greater focus on training programmes that emphasise sustainability and the use of technological and innovative teaching methods. This according to Ayayi (2018), includes training teachers in the use of Information Communication Technology tools which can help to make learning more engaging and relevant to students' lives.

   Additionally, Ogunyemi (2015) maintains that there should be a greater emphasis on continuous professional development, with regular opportunities for teachers to update

their skills and knowledge. Providing teachers with the resources and support they need to succeed will not only improve the quality of education but also help to ensure that students are equipped with the skills and knowledge they need to contribute to sustainable development.

3.   Community and Stakeholder Involvement

A key opportunity for reform in curriculum management in Nigeria lies in enhancing community and stakeholder involvement. Education, particularly in the context of sustainable development, is a shared responsibility that extends beyond the classroom. Community engagement, in Ofoegbu (2009), ensures that the curriculum reflects local needs and values while promoting a sense of ownership and accountability among stakeholders. Similarly, Olowu (2012) opines that by involving parents, community leaders, and local organisations in the curriculum development process, schools can foster a more inclusive and responsive education system.

4.   Public- Private Partnerships (PPPs)

Public- private partnerships (PPPs) also present significant opportunities for advancing curriculum management. Public- Private Partnerships can provide the financial resources, expertise, and innovative approaches needed to overcome many of the challenges facing Nigeria's education system (Babatunde, 2014). For example, private companies can collaborate with schools to develop and implement curriculum content that is aligned with industry needs, thereby ensuring that students are equipped with the skills required in the job market (Olaniyan & Okemakinde, 2008).

5.   Leveraging Technology for Curriculum Implementation

The integration of technology into education offers another promising avenue for curriculum reform. In recent years, there has been a growing recognition of the potential of information and communication technology (ICT) to enhance teaching and learning (Ololube, 2006). E-learning platforms, digital resources, and interactive tools can make the curriculum more accessible and engaging, particularly in under-resourced schools (Jegede, 2015). Moreover, technology according to Agyeman (2016) can facilitate the delivery of curriculum content that is aligned with sustainable development goals, such as environmental education and global citizenship.

The effective use of technology however in education requires significant investment in infrastructure, training, and support. Many schools in Nigeria still lack the basic ICT infrastructure needed to implement technology-enhanced learning, and teachers often lack the skills and confidence to use these tools effectively (Olaniyi, 2020). Addressing these challenges will require a concerted effort by the government, private sector, and international partners to ensure that all students have access to quality education in a digital age.

Curriculum Review and Development for Quality Education

Curriculum review is an essential process for ensuring that educational programmes remain relevant, effective, and aligned with current educational goals and societal needs. A robust curriculum review process involves regular assessment and updating of curriculum content, instructional methods, and assessment strategies. This process should be guided by several key principles, including relevance, coherence, and flexibility. Relevance refers to the need for the curriculum to address the current and future needs of students and society. This includes ensuring that the curriculum is aligned with national development goals, as well as global objectives such as the SDGs. Coherence involves ensuring that the different elements of the curriculum are logically connected and support each other, creating a unified and comprehensive educational experience. Flexibility, also refers to the ability of the curriculum to adapt to changing circumstances and to accommodate diverse learner needs.

Best Practices in Curriculum Development

Drawing on best practices from other countries can provide valuable insights for improving curriculum management in Nigeria. For example, Sahlberg (2011), expressed that countries like Finland and Singapore have implemented highly effective curriculum reforms that have significantly improved educational outcomes. These reforms, according to Darling–Hammond (2017), often involve a strong emphasis on teacher professional development, student-centered learning, and the integration of technology into the curriculum. In addition to learning from international best practices, it is of necessarily important to consider the unique context and challenges peculiar to and confronting Nigeria. These include addressing issues such as cultural diversity, regional disparities, and socio-economic inequalities. A contextualised approach to curriculum development ensures that educational programmes are not only effective but also equitable and inclusive.

Conclusion

The paper conclusively opined that Curriculum management in Nigerian secondary schools is a complex and dynamic process that plays a crucial role in shaping the quality of education and the achievement of sustainable development goals. This article has highlighted the challenges and opportunities associated with curriculum management, including issues related to policy and governance, resource constraints, teacher training, and socio-cultural barriers. Despite these challenges, there are significant opportunities for reform, particularly in the areas of policy-making, teacher capacity building, community involvement, and the integration of technology.

Suggestions

The paper after due conceptual review suggest the need to:

1. Develop Evidence-Based Education Policies: Policymakers should priorities the creation of education and policies grounded in empirical research to ensure they are effective and responsive. Policies need to be flexible and adaptable to accommodate changing educational needs and contexts.

2. Foster Inter-Sectoral Collaboration: Strengthening collaboration among different sectors such as health, agricultural, and environmental is essential for creating a comprehensive curriculum. Additionally, promoting public-private partnerships can provide valuable support for curriculum development and implementation.

3. Enhance Teacher Capacity: Continuous professional development is crucial for teachers to stay updated with innovative teaching methods and Information Communication Technology. Investing in these areas will improve instructional quality and better equip teachers to implement the curriculum effectively.

4. Involve Communities and Stakeholders: Schools should actively engage parents, community leaders, and local organisations in the curriculum development process. This involvement ensures that educational programmes are tailored to local needs and contexts, making them more relevant and effective.

6. Examine Curriculum Reforms: Future studies should focus on evaluating the impact of specific curriculum reforms on student outcomes. This research will help in understanding which reforms are most effective and how they can be improved.

7.   Evaluate Teacher Training Programmes: It is important to assess the effectiveness of professional development programs for teachers. Research should explore how these programmes can be enhanced to better support curriculum implementation and overall educational quality.

8.   Explore the Role of Technology: Research should investigate how technology can be used to enhance curriculum delivery and engage students more effectively. Identifying best practices for integrating technology into the curriculum will help in improving its use.

9.   Investigate Socio-Cultural Factors: Future research should examine how socio-cultural factors influence curriculum implementation. Developing strategies to address these factors will promote a more inclusive and equitable education system.

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The Impact of Politics on Educational Policy Formulation and Implementation in Nigeria

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Abstract

This position paper examined "The impact of politics on educational policy formulation and implementation in Nigeria". The theoretical framework was drawn from the elite theory which was informed by the facts that Nigeria political landscape is characterized by elite dominance, with influential individuals and groups shaping policy decisions. This enables participants understand the power dynamics influencing educational policy formulation and implementation in Nigeria. Educational policies formulated by the government are many, but it is worthy to note that due to some constraint they remain under implemented or unimplemented as a result of elite interest, inadequate funding, poor infrastructure, inadequate man-power, etc. The paper reviewed the implementation of educational policies in Nigeria from independence, highlighting the historical backgrounds of the impact of politics on this process. It discovered that the negative impacts have impeded the implementation of these policies. The paper therefore concluded that politics and education are interwoven in Nigeria as a result of funding by government. The paper suggested that politicians should adopt fairness, accessibility and equity as the major principle in the implementation of educational policies in order to enhance the standard of education in Nigeria.

Key words: Politics, Education, Government, Policy formulation and Policy implementation

Introduction

Education is a fundamental right that enables individuals to acquire knowledge, skills, and values essential for personal and societal development (UNESCO, 2019). Quality education fosters cognitive, emotional, and social growth, leading to improved life outcomes (Hattie, 2015). Education also plays a critical role in promoting economic growth, social mobility, and sustainable development (World Bank, 2020). Moreover, education empowers individuals to think critically, solve problems, and make informed decisions, contributing to a more equitable society (OECD, 2019). The inequitable distribution of educational resources and low educational outcomes are major concerns (Nwogu, 2017).

Nigeria education sector is crucial for national development (Ake, 2017). However, it faces numerous challenges, including inadequate funding and poor infrastructure (Aluede, 2019). Beyond, the above-mentioned problems are the general problems in pertinent areas such as insecurity, poverty, corruption, politics, illiteracy, agriculture, communication, housing, transportation, health, unemployment, etc. Yet, at one point in time or the other, governments formulated policies to help eradicate these problems. Achebe (1983) cited in Ozor (2004) opined that the problem with Nigeria is the problem of leadership. The inequitable distribution of educational resource and low educational outcome are major concerns (Nwogu, 2017). It is clear that the kind of leaders Nigeria need is the type that will have the political will to implement her policies. Over a decade ago, the Nigeria's budget on education has been on the decline (see Fig. 1). The result was unpaid teacher salaries, degradation of education facilities at all levels and strikes in universities/public schools, culminating in declining literacy rates.

The poor state of education in Nigeria is aptly captured in the national empowerment development strategy (IMF, 2005) as follows: the delivery of education in Nigeria has suffered from years of neglect, compounded by inadequate attention to policy frameworks within the sector. Finding from an ongoing educational sector analysis confirm the poor state of education in Nigeria shows that the national literacy rate is currently 77.62% as at 2021 (GlobalData, 2022) see reference. This is expected to have reduced due to the escalating insecurity in different states which has displaced many people from their homes. How can the educational policy be implemented in a country where 17% of our public school teachers and 40% of the private school teaching workforce are unqualified (https://www.google.com) see reference.

There is an acute shortage of infrastructure and facilities at all levels of education. Access to basic education in Nigeria is inhibited by gender issues, religion and socio-cultural beliefs and practices, among other factors (Nwogu, 2017; Obasi. 2020). Wide disparities in educational standards and learning achievements still persist among rural and urban dwellers. The system emphasizes theoretical knowledge at the expense of technical skills which is imperative to attain the current global trend and meet the target of the sustainable development goal of the country. This calls for urgent review to make our education relevant and practical oriented as well as to meet the global standard.

This study which focuses on impact of politics driven by Nigerian elites and educational policy formulation and implementation will contributes to understanding elite dynamics in educational policy and informs policy reforms that will enable the nation attain the Sustainable Development Goal (SDG) on education.

Theoretical Framework

This study derives its theoretical foundation from the Elite Theory which is also refers to as elite model or elite perspective. It was propounded by C. Wright Mills in1956 cited in (Obasi, 2020). Elite theory states that small group of powerful individuals, known as the elite, dominate decision-making processes and shape policies to serve their interests (Obasi, 2020). The theory sees the society as classified, divided or stratified into two, with the masses at the bottom and the ruling-class (elites) is at the top. It explains how power is distributed and exercised in societies among the two classes. These elites are the rich and well-educated, who share common beliefs and use their influence to determine public policies. Any policy which went against this class could be predicted to fail. This theory also focuses attention on the role of leadership in policy making. They elites formulate policies based on their own goals, interest and for the preservation of their clique. This model alerts us to the importance of self-interest in policymaking.

The theory posits that power is concentrated in the hands of a small, cohesive group of individuals who shape policies to serve their interests (Domhoff, 2013). This theory suggests that elites use their position to maintain social order and protect their privileges. The elite is characterizes by the following features:

1. Power concentration: Elite theory posits that power is concentrated in the hands of a small, cohesive group of individuals.

2. Unequal distribution: Elites possess disproportionate wealth, influence, and social status.

3. Self-interest: Elites prioritize their own interests over the needs and concerns of the broader population.

4. Limited mobility: Social mobility is restricted, making it difficult for non-elites to enter the elite ranks.

The choice of Elite Theory for this study on "The Impact of Politics on Educational Policy Formulation and Implementation in Nigeria" was informed by the facts that "Nigeria's political landscape is characterized by elite dominance, with influential individuals and groups shaping policy decisions (Ake, 2017)". Despite the limitation of overemphasis on elite interest, the theory helps to analyze how educational policies in Nigeria serve elite interests, potentially perpetuating inequalities as properly highlighted below:

- Nigeria's political landscape: Nigeria's politics is characterized by a strong elite presence, with influential individuals and groups shaping policy decisions.

- Educational policy formulation: Elite theory helps explain how educational policies are formulated to serve the interests of the ruling elite, potentially neglecting the needs of marginalized groups.

- Implementation challenges: Elite theory sheds light on how elite interests can hinder effective policy implementation, leading to disparities in educational outcomes.

- Inequality and social justice: The theory highlights issues of inequality and social injustice in education, which are critical concerns in Nigeria (Ake, 2017; Obasi, 2020).

School are located in communities from where a prominent figure, be it politician, technocrat, business magnet or influential figures while others are meant to trek long distances to access educational institutions.

Conceptual Framework

The major concepts of this study were reviewed as follows: politics, education, government, policy formulation, and policy implementation

Politics

The term "politics" mean different things to different things to different people. It can be referred to as the activities, actions, and policies that are used to gain and exercise power and control over a government or organization (Ake, 2017). It is the distribution of power, resources, and values within a society (Nwogu, 2017). Obasi (2020) defines politics as the art or science of influencing people and shaping public policy. While Ogundiya (2018) states that politics encompasses the struggle for power, interests, and ideologies within a society.

To some, politics is a dirty game" while to others it is a quick gateway to wealth and comfort. Therefore, it is not surprising that politics is too "dirty: to be associated with education which has been traditionally regarded as one of the political mandates or manifestos.

From the foregoing, politics is the act of influencing people, distributing power and group resources, and exercising control over a government or organization to achieve set goals and shape public policy.

Political Issues in Educational Planning

Politics and education constitute the signpost to the development of an institutional literate citizenry for the sustainability and improvement of society. However, the climax which presently pervades our society is not conducive for the promotion of institutional development. Inadequate curricular provisions in the national policy on education, and total absence of infrastructural facilities in our society have been implicated as impediments.

There is thin line between politics and education and according to Okoroma (2004), politics fashions education and education modifies politics, and because of this relationship, there is impact of politics on education. The political system of a nation has an influence on the educational system. This is why it is believed that no nation can outgrow the quality of its education. As it is known that politics involves the allocation of scarce social, economic and cultural resources in individuals, groups and classes, the allocation that goes into education are politically influenced. For this reason, some nations like Nigeria fail to meet the UNESCO standard on the amount that should be allocated to education because of poor educational policy.

The state of education in Nigeria has been affected by the persistent change in the educational policy and poor funding. These two factors are because of poor political ideology in Nigeria. It is not news that most Nigeria politicians often use sustainable development in education as a positive manifesto in their campaigns promises on education. But its impact on education yields and breeds negative results, for example, the friction between Ogun State governor and academic staff union of Moshood Abiola Polytechnic over turning it into a university of science and technology that wasn't properly taught about and handled by the Government. This friction led to a strike which affected the students and the Polytechnic community Adewale, et al., (2022).

Education

Education is the process of teaching or learning, especially in a school or university" (UNESCO, 2019). It also refers to the development of knowledge, skills and values necessary for individual and societal growth (Adebayo, 2018). World Bank (2020) defines education as a critical component of human development, enabling individuals to acquire knowledge and skills. Olukoju (2018) states that education encompasses formal and informal learning experiences that shapes individuals and societal outcomes. But I see education as the process of teaching or learning through which individuals acquire knowledge, skills, and values necessary for personal and societal growth, through formal and informal experiences.

Government:

Government refers to the institutions and structures that exercise authority and control over a society (Ake, 2017). To Nwogu (2017), government involves the organization and administration of public policies and programs while Obasi, (2020) states that government is responsible for maintaining law and order, providing public services, and protecting citizens'

rights. According to Ogundiya, (2018), government encompasses the executive, legislative, and judicial branches that govern a society.

Government encompasses the institutions, structures, and branches (executive, legislative, and judicial) that exercise authority, maintain law and order, provide public services, and protect citizens' rights.

Government's Participation in Nigerian Education during Colonial Days

A look at the history of education in Nigeria will more or less indicate the important role played by politics on our educational system. As the British Colonial influence in West Africa became stronger, there was the need for well-trained natives to assist in the administration of government agencies. The colonial government began to give grants in-aid to the various missionary groups for the running of schools on the condition that such missions fulfilled the policies of colonial government (Aderinoye, 2016).

In 1886, Lagos was separated from Gold Coast (Ghana) and became the colony and protectorate of Lagos (Ayandele, 2017). This is how the first purely Nigerian Education ordinance was enacted in 1887. The ordinance created a board of education, compromising the governor, members of legislative council, the inspector of schools and four members. This was to make the supervision of schools and grant more effective so increase the involvement of the colonial government.

In 1892 due to the education ordinance, Henry Carr was appointed the inspector of schools, making a significant development in education administration (Olukoju, 2018). A separate education boards were created for the Eastern, Western and central province of Nigeria in 1908. In 1914, the Northern Nigeria was amalgamated under Lord Lugard and this led to this policy on education in 1916 which was partly aimed at educating the Muslims (Ikelegbe, 2006).

A closer assessment of the colonial educational policy in Nigeria shows an element of colonial interest being protected, example the giving of grant and the appointment of the first inspector of education.

Table 1: Federal Government of Nigeria Budget on Education (2014-2023)

Year	Total Budget (NGN trillion)	Education Sector Allocation (%)
2014	4.96	9.5
2015	4.49	8.2

2016	6.07	7.9
2017	7.44	7.4
2018	9.12	7.1
2019	8.92	6.7
2020	10.59	6.5
|2021	13.59	5.6
2022	17.13	5.4
2023	20.51	5.1

Source: Budget Office of the Federation (2014-2023). Federal Government of Nigeria Budget Documents.

A closer analysis of table 1 shows a decline in percentage allocation to the education in the Nigerian Federal government budget in the last decade despite the rise in inflation over the years. This insufficient fund available for education instigates a tougher competition on the available resources which the elites maximizes their opportunity to decide direction of utilization for their own interest. This is bound to elicit inequitable distribution of educational resources and limited access to quality education with a negative policy outcomes and implications.

Policy

Generally, scholars have emphasized policy differently and from various perspectives. Policy refers to a set of principles or guidelines that guide decision-making and action" (Adebayo, 2018). World Bank, (2020), states that policy involves the development and implementation of plans to achieve specific goals. But Olukoju (2018) sees policy as "A deliberate course of action taken by government or organizations to address societal problems". While UNESCO (2019) posits that policy encompasses the rules, regulations, and laws that govern societal behavior. Nwankwoala (2018) defined educational policy as the principles, government policies and collection of laws and rules that govern the conduct of any educational system. To Ezeani (2006) it is the proposed course of action which government intends to implement in respect of a given problem or situation confronting it. Ikelegbe (2006), in a more elaborate form, defined policy as the integrated course and programmes of action that government has set and the

framework or guide it has designed to direct action that provides the direction, the guide and the way to the achievement of certain goals or objectives desired government.

From the foregoing, policy can be referred to a set of institutional or government principles, guidelines or rules that guide decision-making, action, and behaviours to address societal problems and achieve specific goals, in this case educational goals.

Educational Policy Formulation in Nigeria

Educational policy formulation in Nigeria involves the development of guidelines and principles that shape the education sector. Research has shown that educational policy formulation in Nigeria is influenced by political, economic, and social factors (Ake, 2017; Nwogu, 2017).

Process of Policy Formulation

The process involves agenda-setting, policy design, and decision-making (Obasi, 2020). The process involves agenda-setting, policy design, decision-making, implementation, evaluation and policy redesign. The design of an effective policy, all stakeholders should be involved. Ogundiya (2018), challenges include inadequate funding, lack of political will and bureaucratic bottlenecks.

Anderson, (2019), in his book titled Public Policy-making presented the policy evolution model in a circle consisting of the following stages; problem identification, analysis of identified problem, generation of options, policy formulation, planning for policy formulation, policy implementation, policy evaluation and policy redesign or readjustment.

1. Problem identification
2. Analysis of identified problem
3. Generation of options
4. Policy formulation,
5. Planning for policy formulation
6. Policy implementation
7. Policy evaluation
8. Policy redesign
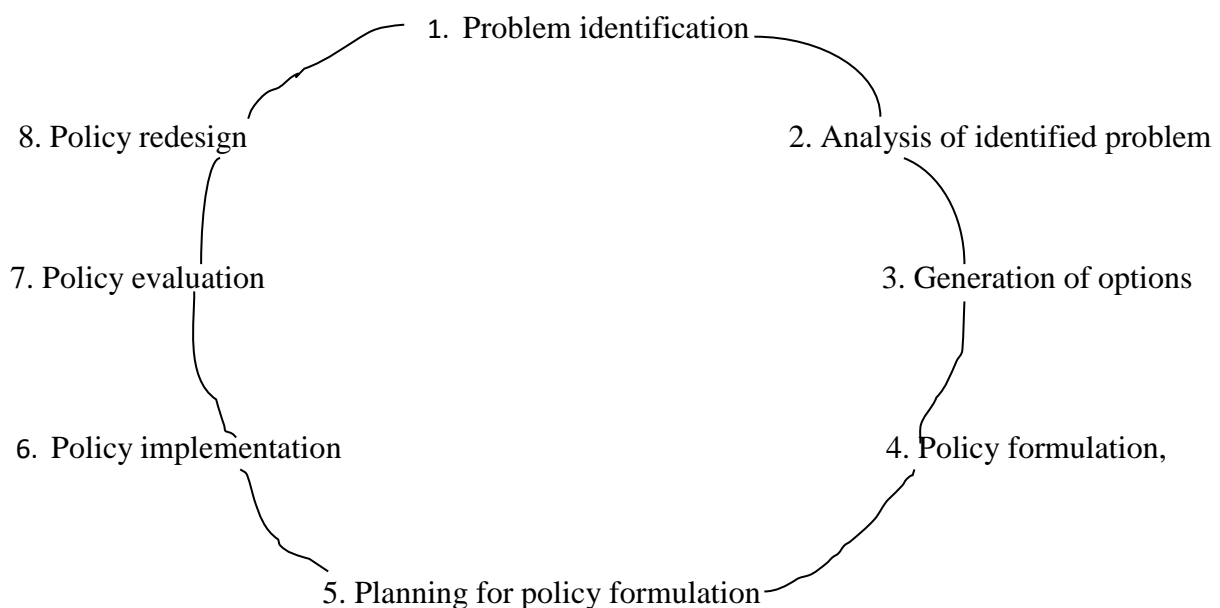
1. **Problem Identification**: This is the first stage in policy formulation identification of the problem or issue to be addressed, e.g. enrolment, funding, facilities, staffing, etc. which may be inadequate and consequently affect education.

2. **Analysis of Identified Problem**: Experts analyses the problem, its context and implications if not addressed. The resources required and possible expectations when addressed.

3. **Generation of Options**: this involves development of alternative solutions and the feasibility of the alternatives. This is done by policy analyst who are technically equipped relying on available data to generate options.

4. **Policy Formulation**: Creation of a policy is done after the evaluation of the various options selecting the best and most feasible option based on finance, time frame and implementability.

5. **Planning for Policy Formulation**: This the stage used in preparing f or the policy implementation. It begins after the policy has been formulated. It includes; how to mobilize the stakeholders, financial and physical resources with all stakeholders made to understand the need for such policy.

6. **Policy Implementation**: This is the execution stage of the policy. This is a time to turn the plan into action. It is usually difficult to implement policies no matter how well articulated this is as a result of overestimation or underestimation resulting to unexpected surprises.

7. **Policy Evaluation**: This is the assessment of the policy effectiveness after implementation. The impact assessment is conducted to reveal the strength and weaknesses of the implemented policy. That is the SWOT- strengths, weaknesses, opportunities and threats on the policy is analyzed.

8. **Policy Redesign or Readjustment**: The policy formulation framework end with readjustment level. This a reaction to the weaknesses and threats observed during evaluation stage. Redesign of the policy based on evaluation results leads to the policy circle and the beginning of another circle.

Stakeholders in Educational Policy Formulation

The key stakeholders in policy formulation include government officials, educators, and civil society organizations (Adebayo, 2018). Educational stakeholders include; ministries of education at various levels, educational administrators, parents, students, host community and civil society organizations,

Need for Good Understanding of the Process of Policy Formulation

There is dire need for a good understanding of the process of policy formulation. This understanding is apt to positively influence the policy thus formulated. It is also likely to enhance to acceptability of such policy its implementation.

Lobbying and advocacy are vital processes involved in policy formulation. There is also a dire need for a thorough understanding of the principles and operation of lobbying and advocacy. The correct application of these indispensable principles is vital for the successful translation of research findings into national educational policy formation and implementation. Bureaucratic bottlenecks, which are common in many developing countries, further elongates the period of policy formulation. This, therefore, often necessitates the need to patiently wait on the policy administrators for long. This naturally translates to more expenses on hotel accommodation, feeding, transportation and communication expenses. These expenses are hardly budgeted for; hence the limited research findings that have been successfully translated into national policies in Nigeria till date.

Policy Implementation

Furthermore, it is one thing to succeed in getting research findings translated into national policies; it is another ballgame altogether getting them implemented. This may often necessitate further following-up and intensive lobbying. Part of the problem here has to do with incessant changes in government and paucity of technocrats within the government. Lack of understanding of the power of well-being formulated policy and diligent implementation in effecting educational and national development apparently account for this (Odukoya, Bowale, & Okulola, 2018).

Impact of Politics on Policy Formulation and Implementation in Nigeria

Politics has both positive and negative implications of policy formulation and implementation in Nigeria. Anderson, (2019) itemizes the following positive and negative impacts as presented below. Thus, buttress the implications and challenges imposed on policy formulation and implementation in Nigeria.

Educational Policies in Nigeria

Here are four educational policies in Nigeria that failed due to various challenges:

6-3-3-4 Education Policy: Introduced in 1998, this policy aimed to provide functional technology-based education to sustain the economy. However, its implementation was hindered by lack of adequate funding, infrastructure, and political instability (Adebayo, 2020).

National Policy on Education (1977): This policy sought to facilitate Nigeria's developmental needs, but its implementation was affected by frequent changes in government, leading to inconsistency and lack of continuity (Ogundipe, 2022).

Curriculum Conference Policy (1969): Held nine years after Nigeria's independence, this policy aimed to re-examine the curriculum and national goals for education. However, its implementation was hindered by political interference, leading to a disconnection between policy formulation and implementation.

Universal Basic Education (UBE) Policy: Launched in 1999, UBE aimed to eliminate illiteracy and raise education opportunities. However, it failed to deliver significant success due to inadequate funding, poor infrastructure, and ineffective management (Salihu and Jamil, 2015; Etuk, Ering, and Ajake, 2012) [1]. The UBE program also faced challenges in achieving Education for All (EFA) due to weak institutional capacity and lack of community involvement (Okoro, 2010).

These policies highlight the challenges faced by Nigeria's education sector due to political instability, corruption, and lack of continuity.

Positive Impacts of Politics in Policy Formulation and Implementation in Nigeria

- **Greater Citizen Participation:** Politics encourages citizens' inclusiveness and involvement in policy-making processes, ensuring that diverse perspectives are considered and enabling effective implementation. This they do directly of through their representatives.

- **Accountability and Transparency:** Political competition promotes accountability and transparency in policy implementation, reducing corruption and ensuring the credibility of the government's commitment to policies

- **Representation of Interests**: Politics ensures various interest groups are represented, protecting minority rights and promoting regulatory quality.

- **Effective Resource Allocation**: Politics influences resource allocation, prioritizing critical areas and enabling the formulation and implementation of sound policies .

- **Policy Evaluation and Adjustment**: Politics facilitates continuous policy evaluation and adjustment, improving effectiveness and enabling the transformation of Nigeria into a more developed nation

- **National Development**: Politics drives policy decisions, shaping Nigeria's national development agenda and addressing societal problems**.**

Negative Impacts of Politics on Policy Formulation and Implementation in Nigeria

- ✓ **Partisan Politics**: Partisanship hinders policy consensus, slowing implementation and creating bureaucratic obstacles.

- ✓ **Corruption and Nepotism**: Politics can lead to corrupt practices and nepotism, undermining policy effectiveness and distorting resource allocation

- ✓ **Inefficient Resource Allocation**: Political interests often distort resource allocation, prioritizing personal gains over national development **.**

- ✓ **Policy Inconsistency:** Frequent policy changes due to political transitions create uncertainty, impeding effective policy implementation

- ✓ **Lack of Expertise**: Political appointments may overlook expertise, compromising policy implementation and effectiveness.

- ✓ **Ethnic and Religious Bias**: Politics can perpetuate ethnic and religious biases, marginalizing certain groups and undermining social cohesion.

- ✓ **Inadequate Citizen Engagement**: Politics may disregard citizen input, undermining democratic principles and the credibility of policy formulation**.** The continued use of a top-bottom approach in policy formulation and implementation can hinder citizen participation, leading to policies that don't address the actual needs of the people

- ✓ **Bureaucratic Red Tape:** Political interference can create bureaucratic botttleneck, delaying implementation and hindering policy progress**.** Bureaucratic inefficiencies can impede the effectiveness of public policy in solving societal problems

- ✓ **Patronage and Clientelism**: Politics fosters patronage and clientelism, undermining policy integrity and effectiveness

- ✓ **Instability and Conflict**: Politics can fuel instability and conflict, derailing policy progress and national development.

- ✓ **Inadequate Policy Definition**: Unclear policy definitions of policy by the policy makers who are agents of the government can lead to confusion and inconsistencies during implementation, undermining policy effectiveness.

- ✓ **Retrospective Policy Analysis**: The lack of retrospective analysis of policy implementation can hinder learning from past experiences, leading to repeated mistakes.

Other negative impacts of politics on policy formulation and implementations include;

- ✓ **Inequality in distribution of educational resources:** It encourages inequitable and uneven distribution of educational facilities as political opponents of the ruling government suffer setbacks and slashing of budgets by the ruling party.

✓ **Distortion of Educational Plan:** The priorities laid down in the educational plan are subjected to substantial distortions in the interest of the ruling party or the political class as project selection and implementation now depend on political payoff.

✓ **Incompetent Administrators:** The inefficient and incompetent administrators who offer the no resistance are often preferred to occupy the strategic positions within the plan administration (Adebayo, et al., (2019).

✓ **Conservative Attitude of some Administrators:** The maintenances of traditional ways of behaviour frequently mean that educational plans are not taken seriously and as such have little chance of being carried out.

✓ **Indiscipline of Politicians:** The lack of discipline by political office holders in the implementation of educational plans.

✓ **Inadequate Funding:** Undue ambitions plan targets and poor financial controls account for many failures to carry out planned projects.

✓ **Political patronage:** Political patronage inhibits effective and rational educational planning as most of the planners have no planning expertise and they plan in accordance with the ruling party dictates to secure their appointment.

Conclusion

It is imperative therefore, that planners should recognize and consider the political realities of a nation in educational planning efforts. Politics, which pervades all spheres of life, is an inevitable ingredient of any subjects "as man is a political being". But the political scenario in Nigeria is characterized by acute political discipline which manifests itself in political prejudge; conflicts and political scheming that are variance with positive development. Unlike in societies where the area of planning or decision making by politicians is kept relatively small, the situation in developing the planning societies like ours is such that politicians dominate the planning efforts and dictate the directions of planning.

The result generally is poor planning directives which culminate in deficient educational system constantly needing review. Okeke, et al, (2020) observed that, "poor planning is often accompanied by dissipated effort, wasted resources and poor results". In fact, educational planning tends to be overwhelmed by political instability in Nigeria which as interfered with most activities including planning of education.

Suggestions

In line with the above discussions in this paper, the following suggestions are hereby offered

1. Government at all levels should quit playing politics with education. Government should place education in a wider context of public service reform, as an essential element in fostering values of openness and democracy. This can be achieved when people with adequate experience and expertise as educators attain leadership positions responsible for forming an implementing educational policy.

2. Government should institute san annual specialized seminar/training session on the significance and process of policy formulation and implementation for researchers and for key government functionaries.

3. Appointments into educational leadership positions should be done by merit and not for political cronies.

4. Supervisory teams should be set up to check mate unethical practices in the field of educational planning, policy formulation and implementation.

5. Budgetary allocations should be reviewed upwardly to help professional planners do the job of policy formulation and implementation.

6. Policy reforms should be undertaken to decentralize policy formulation through community and other stakeholders' involvement.

7. Transparency and accountability mechanisms should be established in order to ensure elite accountability.

8. Educational resource allocation should be equitably distributed according to needs.

9. Implementation and monitoring of the established policies will ensure effective policy implementation.

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Integration of Artificial Intelligence in Curriculum Development: Opportunities and Challenges for Rivers State

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Abstract

This study explores the Integration of Artificial Intelligence (Al) into Rivers State educational system, examining its potential to revolutionize curriculum development and address longstanding challenges in the education sector. As global advancements in AI reshape teaching and learning practices. Rivers State faces unique infrastructural and financial obstacles that hinder the full adoption of AI-driven educational technologies. This research highlights their transformative impact on personalized learning, real-time feedback, and administrative efficiency. The study also evaluates the efforts of the Rivers State government, including the establishment of the National Agency for Research in Robotics and Artificial Intelligence (NARRAI), to foster AI innovation in education. While recognizing the significant hurdles, this research emphasizes the critical need for strategic investment in infrastructure, teacher training, and curriculum innovation to bridge the gap between current capabilities and future demands. The findings underscore the importance of a multifaceted approach, combining government initiatives, academic involvement, and private sector collaboration, to create a scalable, inclusive educational system that prepares Nigerian students for an AI-driven future.

Keywords: Artificial intelligence, Curriculum Development, Innovation, Multifaceted, Robotics

Introduction

In ancient times, traditional classrooms were the main place for student education, using the same teaching methods and consistent guidance from teachers. However, having all students learn at the same time made it hard to meet individual learning needs (Sampayo-Vargas, Cope & Byrne, 2013). Recently, rapid technological advancements have led to many new digital tools and services. The fast development of computer technology has significantly changed the learning environment, with more educational resources becoming computerized.

These technologies improve learning experiences, help develop skills, and promote classroom collaboration, showing the transformative impact of technological progress. It's now possible

to quickly access expert knowledge through intelligent tutoring systems that replicate teachers' expertise to offer personalized help (Pai, Kuo, Liao & Liu, 2021).

Artificial Intelligence (AI) is a powerful force that can reshape social interactions, especially in education. AI-driven teaching and learning solutions are being tested to prepare students for an AI-driven future (Pedro, Subosa, Rivas & Velverde, 2019). The use of AI in education aims to enhance knowledge acquisition, leading to more online learning. This necessitates a paradigm shift in national curricula, formalizing a new educational normal characterized by innovative approaches. This research explores the convergence of curriculum innovation and the integration of artificial intelligence (AI) in Nigeria's educational landscape, recognizing the pivotal role of curriculum in shaping the vision for education.

Curriculum, as the foundation of educational systems, is critical to promoting innovation. As a result, there is a growing realization that curriculum innovation is essential for bridging the gap between obsolete educational techniques and the changing demands of current learners. Incorporating AI into curriculum development is a crucial step towards overcoming space limits in education. AI is a cutting-edge technology that mimics human intellect through machine learning, neural networks, and natural language processing. Artificial intelligence has the potential to transform educational experiences. While AI is still in its early stages in underdeveloped nations like Nigeria, it has already demonstrated potential for personalized learning, real-time feedback, and early detection of learning impediments. The study highlights the importance of AI in aligning educational practices with the demands of the fast-expanding digital age.

In Nigeria and many developing countries are faced with challenges in fully benefiting from AI due to infrastructural limitations and limited internet access. Developing nations struggle with operational and technological challenges, making it hard to integrate AI-backed learning despite its recognized benefits. Financial constraints worsen the situation, hindering the establishment of necessary infrastructure and internet access. In Nigeria, where millions apply for admission, universities cannot accommodate the influx due to technological deficiencies (Adesulu, 2018). Institutions offering distance learning face challenges in providing robust AI e-learning platforms, manual processes are still common due to technological limitations. In advanced countries, AI is at the forefront and widely adopted by well-funded universities. While Nigeria has reputable academic institutions, the lack of financial support hinders their ability to keep up with the latest AI advancements. As a result, scholars in the field of AI show

less commitment to their work. Despite the availability of online learning resources in many institutions, only a few actively develop AI capabilities (Liverpool, Marut, Ndam & Oti, 2009; Robinson, 2018; Adejo & Misau, 2021; Enang, 2022). As observed with online learning, students face computer literacy challenges, making it hard for them to engage with technology-based education. This issue stems from the failure of institutions to innovate teaching and learning methods.

However, the pandemic catalyzed a paradigm shift, with a remarkable 86 percent of educators advocating for the integral role of technology in education (Madhurjya, 2022). This shift underscores the urgency of reconsidering traditional approaches to education and embracing the transformative potential of AI. As the conversation around the convergence of AI and education gains momentum, it is critical to recognize the multifaceted nature of AI's effect, which presents both challenges and opportunities

Integrating AI-enabled learning into universities requires educating teacher educators and providing professional development and support. However, current workshops and training have proven inadequate. AI-based learning could address the challenge of limited physical space on university campuses (Ndzibah & Ofori, 2017). Incorporating AI into curriculum development is a crucial step towards overcoming space limits in education. AI is a cutting-edge technology that mimics human intellect through machine learning, neural networks, and natural language processing. Artificial intelligence has the potential to transform educational experiences. While AI is still in its early stages in Nigeria, it has already demonstrated potential for personalised learning, real-time feedback, and early detection of learning impediments. The study highlights the importance of AI in aligning educational practices with the demands of the fast-expanding digital age.

Scholars and researchers have extensively explored the applications of AI in education, highlighting its multifaceted impact. Among the major AI technologies instrumental in reshaping educational practices are machine vision, expert systems, machine learning, natural language processing, deep learning, and robotics.

1. Machine Vision (MV): Machine vision is commonly referred to as computer vision, is a key technique in artificial intelligence. Richter, Mann, Bond and Gouverneur (2019) describes machine vision as a capability that empowers software to recognize patterns, make predictions, and adapt discovered patterns to unforeseen situations. Operating with high speed, precision,

and accuracy, machine vision replicates human visual perception, utilizing cameras and computers for functions such as recognition, tracking, object measurement, and image processing. This technology finds applications in video surveillance, facial recognition, biometric face scanning, autonomous driving, medical image analysis, and archaeology (Chen, 2019).

In the educational context, machine vision proves invaluable for tasks like atten4ance recording, monitoring students' facial expressions, and detecting signs of confusion in learners. However, the incorporation of machine vision into education holds immense promise for improving attendance tracking, enhancing classroom dynamics through facial expression monitoring, and providing targeted support for students facing challenges in comprehension.

2. Natural Language Processing (NLP): Natural Language Processing (NLP) stands at the intersection of AI and linguistic communication, focusing on emulating human natural language patterns. This technology facilitates interaction with intelligent systems using natural languages, both written and spoken. Kolodny (2017) emphasizes the integration of NLP into various applications, such as talking calculators, enabling oral dictation of numbers and signs. Furthermore, NLP broadens access to information for individuals with visual impairments, hearing difficulties, and motor challenges, fostering independent conversations. Common services like Google Translate and chatbots exemplify the practical applications of NLP, providing multilingual access to information. The incorporation of Natural Language Processing into educational contexts offers avenues for enhanced language learning, spelling and grammatical corrections, and multilingual support. AI-driven writing assistants based on NLP and Machine Learning present opportunities to augment the writing process, providing corrective feedback and recommendations for improvement.

3. Machine Learning (ML): Machine learning (ML) stands as the forefront of Artificial Intelligence, encompassing the design, training, and deployment of models to applications, processes, and other machines. Chen (2019) delineates ML's core components, including algorithms, Application Programming Interfaces (APIs), development and training toolkits, data, and computing power. Goksel and Bozkurt (2019) emphasize ML's dynamic application, utilizing existing data for predictive analysis. In education, ML plays a pivotal role in optimizing course material selection through content providers, employing feedback and scoring systems for assignment grading, plagiarism detection, and student progress assessment. Integration with Natural Language Processing enhances applications like text-to-speech and

language translation, exemplified by Google Translate. ML transforms information retrieval by automating suggestions and recommendations based on geographic location, search history, and user preferences, providing students and lecturers' access to a wealth of internet knowledge. The integration of Machine Learning into educational practices not only streamlines administrative tasks but also enhances the learning experience, offering personalized content recommendations and revolutionizing information retrieval for academic purposes.

4. Expert System (ES): Expert systems (ES) represent a pivotal facet of Artificial Intelligence (AI), embodying the capacity of computer software to replicate human expertise within a specific domain, facilitating problem-solving through a meticulously organized knowledge base. Nwigbo and Madhu (2016) underscore the utilization of expert systems in education, particularly within the Intelligent Tutoring System (ITS). These systems function as adept tutors, delivering personalized learning experiences by considering students' prior knowledge and abilities. Notably, AI-driven career coaches embedded with expert systems provide individualized advice to students, incorporating historical data, experiences, location preferences, skills, and career requirements (Khare, Steward & Khare, 2018). The integration of expert systems into educational frameworks holds significant implications for personalized learning and career guidance. By replicating human expertise, these systems contribute to a tailored and adaptive educational experience, aligning with the diverse needs and aspirations of students.

5. Deep Learning (DL): Deep Learning (DL), synonymous with deep neural networks, represents a sophisticated facet of machine learning primarily utilized in pattern recognition and classification applications with substantial datasets. Chen (2019) highlights DL's capacity to enable virtual assistants to detect and comprehend speech, images, sound, and videos. In the realm of education, DL significantly augments online learning efficiency, as adaptive educational software tailors content to meet individual student needs. This fosters personalized learning experiences, providing avenues for students to receive additional assistance from tutors, thereby enriching the overall learning process. The incorporation of Deep Learning into online learning platforms presents a transformative potential, offering personalized learning experiences and reinforcing the role of technology in addressing individual learning needs.

6. Robotics: Robotics, encompassing the design, construction, operation, and application of robots, represents a multifaceted science and technology domain. The Robot Institute of America's definition underscores the reprogrammable, multifunctional nature of robots,

capable of executing various tasks through programmed motions. Odoh (2018) emphasizes that robots are equipped with sensory capabilities akin to human environmental perception. In the educational context, robots offer synchronous lessons to absent students, exemplified by Avatarion's technology connected to Microsoft Azure IoT Hub. This facilitates full video and audio connections for students in hospitals or homes, allowing them to actively participate in the learning process through a tablet-controlled robot. This innovative approach bridges the gap for physically absent students, transforming traditional learning dynamics. The integration of robotics into education holds significant implications for inclusivity, enabling absent students to engage actively in the learning process. This technological advancement fosters a more accessible and participatory educational environment.

AI in Curriculum Development

Artificial Intelligence (AI) plays a pivotal role in revolutionizing curriculum development, primarily leveraging Machine Learning and Text Mining methods (Somasundaram, Latha & Saravana, 2020). Somasundaram et al. (2020) proposes an innovative educational program model grounded in AI back-propagation concepts, tailoring curriculum elements (prerequisites, content, expected outcomes) to meet labour market demands. While the model exhibits promise, its focus remains confined to the realm of Internet of Things (IoT).

Despite steps in personalized educational systems (Rojas-López & Gracia-Penalvo, 2022), scalability remains a significant challenge. Current approaches focus on key content domains and may compromise on the quality of educational content due to scalability issues (Zhang, James & Yang, 2020). There is an urgent need for a scalable and dynamic curriculum development approach that caters to individual learner needs, encompasses relevant knowledge areas, integrates high-quality educational content, and requires minimal maintenance efforts (Zhang et al., 2020). The integration of AI into curriculum development heralds a new era of personalized education, aligning with individual learner needs and labour market demands. However, addressing scalability issues is imperative for sustained success, ensuring that educational systems can adapt dynamically to evolving requirements while maintaining high standards of content quality and relevance.

Artificial Intelligence (AI) has become a focal point in Nigeria's educational landscape, exemplified by the establishment of the National Agency for Research in Robotics and Artificial Intelligence (NARRAI) in 2018. The government, recognizing the transformative potential of AI, entrusted NARRAI with the coordination and oversight of all AI and robotics

research endeavours. Minister of Science and Technology, Dr. Ogbonnaya Onu, emphasized NARRAI's commitment to collaboration with international research bodies, partnership with tertiary institutions, and the facilitation of Nigeria's proficiency in leveraging AI technologies for economic growth (Ladeinde, 2019). This strategic initiative reflects the government's proactive stance in integrating Al into the national curriculum.

Efforts of AI Integration in the Nigerian Government

In alignment with its commitment to advancing AI, the Nigerian government has taken substantial steps, as illustrated by the formation of NARRAI. Bobai Ephraim Kato's accomplishment in developing a functional AI robot for his final year project further exemplifies the individual initiatives within the country. Kato's creation, capable of puzzle-solving, underscores the potential for AI to contribute meaningfully to problem-solving in education (Ogbonnia, 2017).

Initiatives like ScholarX, a Nigerian social impact start-up, are pivotal in addressing educational disparities. ScholarX focuses on providing access to quality education for young Africans from low-income backgrounds through scholarships, crowd funding, and e-learning initiatives (Nsehe, 2019). The AI innovation from the Obafemi Awolowo University iLab team, particularly the Remote Lab developed by Ishola Babatunde Isaac, showcases the practical integration of AI in educational settings. This system allows students to control laboratory equipment remotely, overcoming constraints of time and space for experimentation in Nigerian universities (Ogbonnia, 2017).

Furthermore, global technology giant Google's establishment of an AI research hub at the University of Lagos in June 2018 highlights the international recognition of Nigeria's potential in AI research and development (Hussain, 2018). These collective efforts, both at the governmental and individual levels, demonstrate a comprehensive approach to integrating AI into the fabric of Nigerian education, with far-reaching implications for curriculum development. The active involvement of the Nigerian government and innovative individuals in fostering AI initiatives signals a paradigm shift in curriculum development. The establishment of NARRAI and various AI applications in education imply a commitment to enhancing learning experiences, promoting problem-solving skills, and preparing students for a technologically advanced future. The synergy between government initiatives and grassroots innovations holds the promise of, a curriculum that aligns with the evolving demands of the digital age.

Conclusion

Curriculum changes are prompted by evolving societal needs, cultural shifts, and responses to economic, social, and political dynamics. Technological advancements, such as the integration of artificial intelligence (AI), play a pivotal role in reshaping curriculum implementation within tertiary education. This paper has explored the multifaceted contributions of AI in Nigerian tertiary institutions. The integration of Artificial Intelligence (AI) into Nigeria's educational system presents both significant opportunities and considerable challenges. As AI technologies continue to revolutionize global education, Nigeria must strategically address infrastructural and financial constraints to fully benefit from this transformation. The establishment of the National Agency for Research in Robotics and Artificial Intelligence (NARRAI) and various AI-driven initiatives reflect the country's commitment to embedding AI within its curriculum development framework. However, for these efforts to bear fruit, sustained investment in infrastructure, teacher education, and curriculum innovation is essential.

Embracing AI offers the potential to personalize learning, optimize educational resources, and equip students with the skills needed for a rapidly evolving digital landscape. The road ahead demands a concerted effort to bridge the gap between current capabilities and the future demands of education, ensuring that Nigeria's learners are prepared to thrive in an AI-driven world. This will require a multifaceted approach, combining government initiatives, academic involvement, and private sector support to create a robust, scalable, and inclusive educational system. Ultimately, the successful integration of AI into Nigeria's educational landscape could serve as a model for other developing nations, highlighting the transformative power of technology in shaping the future of education.

Suggestions

Based on the findings of this study, the following recommendations are suggested:

1.   Government and relevant authorities in education to create comprehensive training programs for educators to improve their understanding and application of AI in the classroom. These programs should focus on both the technical aspects of AI and pedagogical strategies for effectively incorporating Al tools into teaching and learning processes.

2.   Opportunities for collaboration between the government, academic institutions, and private sector tech companies. Public-private partnerships could provide the necessary

infrastructure, funding, and expertise to accelerate the integration of AI in education, particularly in under-resourced areas.

3. Government through appropriate agencies should provide professional training and freedom, granting teachers the opportunity to pursue relevant courses during school hours, to support their competence and enhance their contribution to curriculum development. Employee of educators and school leaders should foster collaborative learning experiences among teachers, utilizing mentorship programs and group activities, to enhance relatedness, promote a sense of belonging and community among educators, and increase their motivation and engagement in curriculum planning.

4. There is need for continuously evaluate the effectiveness of autonomy-supportive strategies and professional development initiatives in fostering teachers' motivation and engagement and adapt approaches based on feedback and outcomes to ensure sustained commitment to curriculum development efforts.

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Artificial Intelligence (AI)-Driven Decision Support Systems for Sustainable Administration of Public Universities in Rivers State, Nigeria

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Abstract

The integration of Artificial Intelligence (AI) in the administration of public universities has the potential to greatly enhance decision-making processes, ultimately leading to more sustainable and efficient institutions. The manual handling of vast data from various silos in the traditional manner is proving to be outdated and unsustainable. To effectively work towards achieving sustainable development goals, universities must capitalize on Artificial Intelligence technologies for informed decision-making, resulting in enhanced operational efficiency and improved student outcomes. This paper examines AI-driven decision support systems for sustainable administration of public universities in Rivers State, focusing on the potentials and challenges associated with its utilization. By leveraging on artificial intelligence, the decision support system analyze the vast data and enables institutions to make informed decisions regarding document management, student outcome prediction, resource allocation, and strategic planning, ultimately contributing to a more sustainable future for these universities. This potential enables the AI system to address current challenges and consequently paves way for advancement. The paper concludes that AI technologies have become very imperative for the effective and sustainable administration of public universities in Rivers State, Nigeria. The paper recommends inter alia that the administration of higher institutions in Rivers State should implement the application of AI technologies for enhanced operational and administrative effectiveness.

Keywords: Artificial Intelligence, Decision Support System, Sustainable Development, Public Universities

Introduction

Educational management is considered as an integral part in the realization of sustainable development. Sustainable development entails responsible management of resources to ensure their availability for future generations. In other to achieve quality education which is one of the sustainable development goals (SDGs), artificial intelligence (AI)-driven decision support systems need to be integrated into various aspects of educational processes. AI-driven decision support systems in education leverage artificial intelligence (AI) technologies such as adaptive learning platforms, intelligent tutoring systems, and personalized contents recommendations to enhance decision-making processes, as well as supporting students within educational institutions (Aballa, Akintayo, &Eneh, 2024). These systems harness the

power of data analytics, predictive modeling, and machine learning to optimize students' enrolment, resource allocation, strategic planning and curriculum development (Zhang & Goyal, 2024).

Artificial intelligence (AI) which is an aspect of computer science involves development of AI algorithms, and programming machine language (ML) modeled after the decision-making processes of the human brain, that can learn from available vast data and make increasingly more accurate classifications or predictions over time (Rouse, 2024). It replicates human capabilities through combination of advanced technologies that enable it sense, comprehend, learn and act with a level of intelligence comparable to human cognition (Widodo, Korwa, &Nuraini,2023).They explained further that AI systems perceive environment, recognize objects, imitate patterns, and learn from past experiences which enable it to contribute to decision-making and solve complex problems, hence making its usage in many industries, including education successful for sustainable development.

Sustainable development goals (SDGs) are a set of 17 global objectives adopted in 2015 by the United Nations to achieve a sustainable future by 2030 (Avurakoghene & Oredein 2023). They are intended to address pressing global challenges such as: climate change and environmental degradation, poverty and inequality, economic instability, inequality, social justice and human rights. The need for sustainability in education is crucial and include but not limited to practices that ensure long-term accessibility, effective use of resources and environmental considerations. According to UNESCO (2024), education for sustainable development (ESD) is a lifelong learning process that equips learners of all ages with skills, knowledge and values that would enable them make informed decisions, take action to change society and care for the planet. An educational system designed to be able to support learners of all ages, adapt to changing circumstances- socially, environmentally, economically, and reduce its impact on the environment is referred to as sustainable learning (Alshahrani, 2023). AI is playing an essential role in the actualization of the SDGs, by increasing the effectiveness of sustainable learning. Educational administrators utilizing AI can access a decision support system to identify and improve slow processes, offer guidance and training to employees for increased efficiency and sustainable growth.

Public universities in Rivers State handle large amounts of data using the traditional documentation process which heavily relies on paper usage, with each document often being duplicated and submitted to multiple offices – sometimes more than three times. When

multiplied by thousands of students across these public universities, this practice results in substantial deforestation and incurs significant financial costs. Students often need to request success letters, transcripts, and certificates from their universities for various purposes, such as pursuing further education, applying for scholarships, or career advancement. Typically, universities rely on historical physical records stored in their archives to decide whether to issue such documents. However, students are still required to submit the documents they provided during their enrollment and registration processes. The process of retrieving a student's file from the archives can take anywhere from two weeks to several months. In some cases, the file may be completely missing, prompting the university to request that the student resubmit all relevant documents all over again. Once the file is retrieved, processing the request can take additional weeks as the documents move through multiple administrative desks. This inefficient process leads to significant time delays, mismanagement of resources, decreased satisfaction resulting in reduced retention rates and negative word-of-mouth. All of which compromise student success and institutional effectiveness. There have been various studies on the use of AI to enhance student learning experience and performance, predict student outcomes and ease admission processes. However, there seem to be a dearth with regards to leveraging AI in automating documentation processes, this paper therefore seeks to examine this gap. AI-driven DSS, integrate data from different silos, using predictive analytics, machine learning, and data visualization. Implementing AI-driven DSS can reduce the manual stress on staff and administrators in public institutions, help them make faster and more efficient decisions, thereby reducing processing times, improving resource management as well as enhance the reputation of these institutions.

The purpose of this study is to examine the potential of AI-driven decision support systems (DSS) in promoting sustainable administration within public universities in Rivers State, Nigeria. By addressing the challenges of inefficiency, resource mismanagement, and decision-making delay often faced by these institutions, the study aims to highlight how AI technologies can enhance administrative processes, improve accountability and foster long-term sustainability in university governance.

Concept of Sustainable University

Sustainable university administration refers to the ability of universities to operate efficiently, maintain resources, and achieve their goals over time. It involves the integration of sustainable development principles and practices into the management and functions of a university

(Muentes, Alcívar, León, & Chata, 2023). It involves: Environmental sustainability, which entails reducing the institution's ecological impact through energy-efficient methods, waste management, and sustainable use of resources. Social sustainability, which focuses on fostering social justice, equity, and inclusivity within the institution and its community. Economic sustainability, which involves ensuring the financial stability, supporting economic growth and advancement. According to Lane (2021), a sustainable university places sustainability at the core of its research and teaching activities. It is committed to addressing current needs while ensuring that future generations can meet their own needs without compromise.

Sustainable university administration is significant due to its ability to prepare students for a sustainable future by providing them with knowledge, values and skills necessary to address global sustainability issues (Katarína, 2021). It plays a crucial role in minimizing the institution's environmental footprint and promoting sustainable practices (Muentes, Alcívar, León, &Chata2023). Additionally, it enhances the reputation and appeal of the institution by showcasing dedication to sustainability, hence attracting students, staff and partners. Moreover, it supports community development by contributing to local economic progress, social justice, and community involvement. It also encourages innovation, entrepreneurship, and job creation in a sustainable manner, while ensuring the institution's long-term viability by promoting financial sustainability and maintaining its relevance and impacts. By addressing global challenges, sustainable university administration contributes to the achievement of the United Nations' Development Goals (SDGs).

Theoretical Framework

The theoretical framework to this study examined the Systems Theory of Ludwig von Bertanlaffy which posits that an organization is a complex of an interconnected system where each part contributes to the whole.

Systems Theory (Ludwig Von Bertalanffy)

The theory was posited by Ludwig von Bertalanffy, an Austrian-Canadian biologist and philosopher, in the 1940s. The theory views organizations as complex, dynamic systems comprising interdependent elements that must be strategically aligned and coordinated to achieve optimal performance, efficiency, and success (Chikere & Nwoka, 2015). Similarly, a university functions as a system made up of interconnected subsystems, such as academic departments, administration, and finance, all working together to achieve the shared objective of academic excellence. Systems Theory emphasizes that the institutions should be viewed as

integrated systems, rather than separate functions or departments for effective coordination and collaboration among these subsystems.

This theory is applicable to the study of AI-driven Decision Support Systems (DSS), as it underscores how an AI system interacts with and impacts various administrative and academic functions. The implementation of AI-enabled systems facilitates real-time data sharing and decision-making, enabling access to critical data across silos. This interconnectedness enhances institutional coherence and efficiency, aligning with the holistic perspective of systems theory.

Overview of AI applications in education

The application of AI in education comprises a diverse range of tools and technologies that are transforming the field of education. Personalized learning, intelligent teaching platforms, ChatGPT, chatbots, automated knowledge evaluation, virtual reality and extended reality are some examples of such applications (James, 2024; Mithu & Ajith, 2024). They explained further that AI adapts to the pace and needs of individual learners, providing personalized learning experience, while intelligent teaching platforms provide customized feedback and guidance. It automates administrative tasks such as scheduling, and resource allocation, allowing educators focus more on engaging with students (Hambali, Olasupo & Dalhatu, 2020), while also enabling students to concentrate on their academic pursuits instead of being involved in prolonged registration procedures. AI-powered virtual assistants support students with study tips that enhances their learning experience outside the class. Funda (2024) opined that AI systems can track performance and identify learners that are at risk of falling behind, enabling educator's timely intervention. AI-powered translation tools enable non-native speaker understand the educational materials and equally support special need students, promoting inclusivity in diverse classroom. By providing individualized learning opportunities, predicting learning outcomes, automating administrative tasks, supporting students with special needs, and facilitating resource planning, artificial intelligence (AI) in education seeks to increase efficiency, inclusivity, and impact (James, 2024).

Additionally, the use of AI in education addresses important problems like data-driven decision-making, ethical dilemmas, and the potential for future developments in the integration of virtual reality, adaptive learning systems, and universal access to high-quality education, which will ultimately change learning paradigms (Pranav, Nausheen, &Surinder, 2024). Nevertheless, Bobula (2024) emphasized that adoption of AI in higher education has challenges such as ethical concerns like bias in AI decision-making, data privacy, and surveillance. Nargis

and Kumari (2024), added that there is need by institutions to acquire robust infrastructure that can support AI adoption, and train instructors, students and administrative personnel on effective use of AI-powered tools. According to Gulyamov (2024), some administrative and teaching tasks may be automated, potentially displacing jobs, therefore, over-reliance on AI may diminish human interaction and critical thinking skills. He emphasized the need for continuous evaluation of AI systems and collaboration among experts and stakeholders for optimizing AI in decision-making. It is important that AI systems are accurate, secure and can be integrated with existing infrastructure.

Several case studies demonstrate the effectiveness of AI-driven Decision Support Systems (DSS) in education globally, higher institutions in Nigeria are also leveraging AI to enhance various educational processes. Aderuyi and Amaewhule (2024), examined the adoption of AI to sustain lecturers' academic integrity, they concluded that while lack of competence and career progression can drive lecturers to academic fraud, AI provide them with personalized learning. Afonughe, Onah, Uzoma, Andor, and Orisakwe (2021), investigated the integration of AI-chatbot into teaching and learning in South-South, Nigeria. They found out that universities in South-South are yet to integrate the AI-chatbot into administration task and education, and that traditional approach of teaching and handling administrative tasks are still in use. By implementing AI-driven systems institutions can create a more efficient, effective, and student-centric environment, ultimately driving success and excellence.

Sarjiyus, Goni, and Jamilu (2019) developed an intelligent decision-support system for university admission and placement of potential students in Nigerian universities. Their findings showed that the system chose the most qualified applicants, while placing other eligible applicants who did not meet the requirements for a particular program into alternative courses that are available and for which they qualified. Neelakrishnan (2024) provided decision support system for redefining enterprise data management with AI-powered automation to show how AI technologies can enhance data accuracy, processing efficiency and decision-making capabilities. The results indicated that the implementation of AI-driven automation leads to significant improvement in processing speed and data accuracy. Widodo, Korwa, and Nuraini, (2023) developed a system to identify and implement strategies for the implementation of artificial intelligence in lecturer performance evaluation systems in higher education. They focused on how to improve the efficiency of lecturers' evaluation process, objectivity, accuracy, and providing meaningful feedback to the lecturers. The result revealed that implementing

artificial intelligence in the lecturers' performance evaluation system succeeded in improving the accuracy of the evaluation.

Benefits and challenges associated with the adoption of AI-driven systems

The benefits of AI-driven DSS in education are numerous, and they enhance both teaching and administrative processes. AI-driven DSS has the ability to automate routine administrative tasks, such as scheduling and student record-keeping, thereby allowing educators and administrators focus more on engaging with students and improving the learning outcomes Avurakoghene and Oredein (2023). Additionally, Mithu and Ajith, (2024) explained that AI-driven DSS analyzes individual student data, and tailors the educational content to meet the diverse learning preferences and needs of each learner, thereby providing personalized learning experiences. Pranav, Nausheen, and Surinder (2024) added that such personalization enhances student engagement and outcomes. Furthermore, Funda (2024) explained that AI-driven DSS uses predictive analytics to assist educators identify at-risk students, enabling timely interventions through support and hence improving educational effectiveness. According to Funda (2023), AI-driven DSS can learn from historical data, optimize resource allocation strategies, and ensure resources are efficiently utilized to align with organizational goals. This transformative approach streamlines operations and equally foster a data-driven culture, improving operational efficiency and productivity within the universities (Kumar, 2024). The systems support research excellence by selecting and analyzing large volumes of literature with speed and accuracy, identifying patterns and relationships that may not be immediately apparent to human researchers, and also enhance collaboration and knowledge sharing, which invariable improves the quality of the research (Braun, Hummel, Beck & Dabrock, 2020). Other benefits of applying AI in DSS for sustainable development include: reduction in costs, increased accuracy and efficiency, enhanced productivity and better decision-making.

A major challenge is the integration of existing administrative procedures and infrastructure with AI-driven DSS, often due to outdated structures, resistance to change, or a dearth of expertise. AI-driven DSS is data driven, therefore quality and quantity of data must be ensured, the data must be complete, accurate and relevant. According to Abdulsalam, Adnan, Nasr, and Yousra (2023), Uggla and Soneryd (2023), financial constraints poses a significant challenge, educational institutions may lack the necessary resources to adopt these technologies, or educate staff on effective use and interpretation of AI-driven DSS recommendations, thereby slowing the pace of advancement. Cybersecurity and data privacy concern is another challenge

highlighted by James (2024), emphasizing that data collection, storage and usage need to be carefully managed to avoid data compromise or misuse. The pursuit of sustainability goals requires commitment across all institutional levels. However, the issue of inconsistency in stakeholder engagement and buy-in can prevent the adoption of AI-driven DSS and the development of inclusive initiatives, which obstructs progress towards a sustainable future. Funda (2024), stressed that education institutions may encounter opposition arising from established practices or cultural beliefs that do not align with sustainability objectives.

AI-Driven Decision Support Systems in Public Universities: Improving Student Support Services

1. **Machine Learning (ML)**: ML algorithms are employed to analyze large datasets, identify patterns, and make predictions. This helps in enhancing the decision-making capabilities of DSS by learning from historical data and improving over time.

2. **Expert Systems**: These systems use knowledge-based AI to simulate the decision-making ability of a human expert. They are particularly useful in situations requiring specialized knowledge and are often integrated into DSS for tasks like diagnostics and troubleshooting

3. **Data Mining**: AI-driven data mining techniques help in discovering hidden patterns and relationships within large datasets, which can then be used to inform decision-making processes within DSS.

4. **Natural Language Processing (NLP)**: NLP allows DSS to interact with users in natural language, making the systems more accessible and user-friendly. It enables the processing and analysis of unstructured text data, such as emails and reports.

5. **Fuzzy Logic**: This AI technique is used to handle uncertainty and imprecision in decision-making. Fuzzy logic systems are integrated into DSS to enable it make decisions in uncertain environment.

6. Predictive Analytics: This AI technique uses data mining, statistical models, and ML to forecast trends and outcomes.

7. Deep Learning (DL): DL is a subset of ML which uses neutral networks to analyze complex data such as text and images.

AI-Driven Decision Sustainable Administrative Practices

AI-driven systems for document management and automation decision Support Systems (DSS) utilize artificial intelligence technologies to enhance the efficiency and accuracy of

administrative processes (Kumar, 2024). These systems according to James (2024), address the issues associated with traditional data management by automating administrative tasks such as scheduling, grading, and resource allocation, thereby enhancing resource utilization, reducing waste, and improving overall efficiency. Kumar (2024), added that the integration of AI in document management not only simplifies workflows but also enhances resource allocation and decision-making via predictive analytics and sentiment analysis.AI-driven systems is transforming administrative decision-making by minimizing waste and improving efficiency. They automate and streamline processes, significantly reducing the time administrative officers spend manually reviewing archived files. By utilizing natural language processing for email organization and virtual assistants for administrative support, AI-driven DSS transform how institutions manage data, ensuring real-time insights and data integrity (Neelakrishnan, 2024). The integration of AI in data management systems has transformative impact which is evident in its ability to automate processes, thereby alleviating the workload of administrative staff, reducing errors, and enhancing collaborative work environments (Widodo, Korwa, &Nuraini,2023).

AI-driven DSS apply predictive analytics to document management by automating document classification, tagging, and categorization. It groups similar documents together for easy management and efficient retrieval, generate concise summaries and forecast document relevance and ranking for improved search results. By leveraging AI-driven DSS, universities can implement sustainable administrative practices, accurately predict resource needs and demands, and effectively plan and allocate staff. These systems also enable forecasting of future resource requirements and minimize equipment and resource downtime through proactive maintenance scheduling.

Ethical Considerations and Future Directions

AI in higher education management faces ethical challenges such as biases in data, leading to unfair results affecting admissions, grading and resource allocation. Privacy concerns arise from vast data collection, raising issues about personal information protection. Users may struggle to understand AI decision-making, making it hard to hold institutions accountable. Reliance on AI may reduce human autonomy, increasing dependence on automated systems. Job displacement due to AI automation raises concerns about future work and the need for up skilling in educational institutions (Gulyamov2024).

Future research in AI for sustainable higher education management should focus on improving decision support systems to enhance resource allocation and institutional efficiency. Universities can use AI-driven analytics to predict enrollment trends, manage budgets, and customize educational offerings to meet student needs, promoting sustainability. George and Wooden (2023), explained that exploring multimodal learning analytics can offer insights into student engagement and performance for personalized learning experiences. Afolabi (2024), opined that research should address data privacy and algorithmic bias to ensure ethical AI use in education. Avurakoghene and Oredein (2023), added that AI can help manage renewable energy resources, optimize energy consumption, and reduce waste in university infrastructures to support eco-friendly initiatives. These efforts can significantly aid in the sustainable transformation of higher education institutions.

Conclusions

AI-driven decision support systems (DSS) are crucial for sustainable higher education management, enhancing operational efficiency and making informed decision. These systems analyze vast amounts of data to provide clear understanding of the situation, facilitating strategic planning, resource optimization, and improved student services, ultimately leading to better educational outcomes and increased student satisfaction. However, the successful implementation of AI in higher education faces challenges, including data quality issues, privacy concerns, and the need for continuous technological advancements. Promoting a culture of collaboration and breaking down data silos within institutions are necessary for maximizing the benefits of AI DSS.

Suggestions

1. AI-driven DSS holds transformative potential, there should be careful consideration of its challenges and ethical implications for effective application.
2. Higher education institutions should integrate AI, DSS with the existing infrastructures to manage resources more efficiently and attain sustainability.

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Roles of AI-Powered Assessments in Enhancing the Professional Development of Academic Staff in Public Universities in Rivers State

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Abstract

The study examined the roles of ai-powered assessments in enhancing the professional development of academic staff in public universities in Rivers State. Three objectives and three research questions guided the study. The study adopted the descriptive research design. The population of this study was drawn 2,849 male and female lecturers in the three public universities in Rivers State. The sample size of the study was 360 respondents. The sample size was determined using Taro Yamane formula. However, the proportionate stratified sampling technique was adopted in selecting a total of 180 male lecturers and 180 female lecturers from the three universities under study. The instrument used for data collection was a self- structured questionnaire titled" Roles of AI-Powered Assessments in Enhancing the Professional Development of Academic Staff Questionnaire". This instrument was validated by two experts. The reliability co-efficient index obtained through the Cronbach Alpha method was 0.76, 0.78 and 0.83 which was considered reliable. Research questions were analyzed using mean and standard deviation. The findings of the study revealed among others that AI-powered assessments provide timely and actionable feedback that improves teachers' teaching practices, the use of AI-powered assessments has significantly enhanced teachers' ability to identify areas for professional growth, it offers personalized recommendations that are relevant to teachers' professional development needs and their confidence in adapting to new teaching strategies has improved. Based on the findings, it was recommended among others that Public universities in Rivers State should prioritize the adoption of AI-powered assessment tools as part of their professional development programmes. Institutions should invest in integrating these tools into their teaching evaluation processes to enable academic staff to access personalized, data-driven feedback that enhances their teaching practices and facilitates continuous professional growth.

Keywords: Artificial Intelligence, AI-Powered Assessment, Professional Development, Universities.

Introduction

The integration of Artificial Intelligence (AI) into educational practices is revolutionizing how academic processes are designed, implemented, and assessed globally. Among its numerous applications, AI-powered assessments stand out as transformative tools that have the potential to redefine teaching and learning outcomes, particularly in higher education. As

institutions worldwide grapple with the demands of fostering academic excellence, enhancing the professional development of educators has become a priority. Professional development, a dynamic process aimed at equipping educators with the necessary skills to improve their teaching practices and adapt to emerging trends, has traditionally relied on structured training programs, workshops, and seminars. While these conventional methods remain valuable, they are often criticized for their lack of personalization and inability to address the diverse needs of academic staff (Zawacki-Richter et al., 2019).

AI-powered assessments leverage advanced technologies such as machine learning, natural language processing, and predictive analytics to offer innovative solutions to some of these challenges. By automating the assessment process and providing data-driven insights, these systems enable academic staff to receive immediate, detailed feedback on their teaching effectiveness and areas requiring improvement. Additionally, AI systems can facilitate reflective practices by identifying patterns in teaching performance and recommending targeted interventions. For example, AI-driven tools such as intelligent tutoring systems and adaptive learning platforms have been shown to significantly enhance teaching outcomes and support professional growth (Alonso & Gago, 2020). These developments are particularly relevant in public universities, where resource constraints and the need for continual staff development often coexist.

In the Nigerian context, public universities, including those in Rivers State, face unique challenges that underscore the importance of leveraging AI technologies for professional development. Limited funding, inadequate technological infrastructure, and the growing demand for quality education place immense pressure on academic staff to adapt and excel. Integrating AI-powered assessments offers a practical solution to some of these issues by providing scalable, efficient, and personalized development opportunities. Research has shown that the use of AI in education can lead to significant improvements in teaching methodologies, curriculum design, and overall institutional effectiveness (Chen et al., 2020). However, the adoption of AI in Nigerian universities remains in its infancy, with limited empirical evidence on its specific impact on professional development.

Despite its potential, the implementation of AI-powered assessments is not without challenges. Concerns about data privacy, ethical considerations, and the readiness of academic staff to adopt these technologies have been highlighted in recent studies (Holmes et al., 2021). Moreover, the cultural and institutional dynamics in Nigerian universities present additional

layers of complexity. The effective integration of AI technologies requires not only robust infrastructure but also a supportive environment that fosters innovation and collaboration among stakeholders. Addressing these challenges necessitates a nuanced understanding of the local context and a strategic approach to policy formulation and capacity building.

This study situates itself within this critical discourse by exploring the role of AI-powered assessments in enhancing the professional development of academic staff in public universities in Rivers State. It seeks to bridge the gap in existing literature by focusing on a specific geographical and institutional context, providing insights into how these technologies can be effectively integrated into higher education systems in Nigeria. By examining the experiences and perceptions of academic staff, the study aims to contribute to the growing body of knowledge on AI in education and its transformative potential in addressing professional development challenges. The findings are expected to inform policy and practice, guiding stakeholders in leveraging AI technologies to achieve sustainable academic excellence.

Statement of the Problem

The professional development of academic staff in higher education is a critical factor in ensuring quality teaching, research, and institutional effectiveness. In public universities in Rivers State, academic staff are faced with the challenge of adapting to the rapidly changing demands of education, particularly in a globalized and technologically driven era. Traditional professional development initiatives, such as workshops, seminars, and training programs, often fall short in addressing individual needs, providing timely feedback, and fostering continuous improvement. These approaches are frequently constrained by limited resources, lack of personalization, and the absence of real-time, actionable insights into teaching effectiveness and learning outcomes.

Artificial Intelligence (AI)-powered assessments present a transformative opportunity to address these shortcomings by providing data-driven, personalized feedback and recommendations. Such tools have been proven to enhance professional development by enabling reflective teaching practices, identifying specific areas of improvement, and offering targeted learning pathways. However, in the context of public universities in Rivers State, the integration of AI-powered assessments remains largely unexplored. There is a paucity of empirical evidence on how these technologies can be effectively utilized to support the professional growth of academic staff within the unique socio-economic and infrastructural constraints of the region.

Furthermore, barriers such as limited access to technological infrastructure, low levels of digital literacy among educators, and concerns about data privacy and ethical implementation further compound the problem. Without a strategic approach to leveraging AI-powered assessments, the potential for these tools to enhance teaching quality and professional development may remain untapped, perpetuating the inefficiencies and challenges faced by academic staff.

Purpose of the study

The study examined the role of AI-Powered Assessments in Enhancing the Professional Development of Academic Staff in Public Universities in Rivers State. Specifically, the study sought to achieve the following objectives:

1. assess the effectiveness of AI-powered assessments in enhancing the professional development of academic staff in public universities in Rivers State.

2. identify the challenges to the adoption of AI-powered assessment tools in public universities in Rivers State.

3. investigate the perceptions and experiences of academic staff regarding the use of AI-powered assessments for professional development.

Research Questions

The following research questions guided the study:

1. How effective are AI-powered assessments in enhancing the professional development of academic staff in public universities in Rivers State?

2. What are the challenges to the adoption of AI-powered assessment tools in public universities in Rivers State?

3. What are the perceptions and experiences of academic staff regarding the use of AI-powered assessments for professional development.

Methodology

The study adopted the descriptive research design. The population of this study was drawn 2,849 male and female lecturers in the three public universities in Rivers State. This comprises 1330 lecturers from University of Port Harcourt, 1095 from Rivers State University and 424 from Ignatius Ajuru University of Education. The sample size of the study was 360 respondents. The sample size was determined using Taro Yamane formula. However, the proportionate stratified sampling technique was adopted in selecting a total of 180 male lecturers and 180

female lecturers from the three universities under study. The instrument used for data collection was a self- structured questionnaire titled" Roles of AI-Powered Assessments in Enhancing the Professional Development of Academic Staff Questionnaire" (RAPAEPDACQ) and the instrument contains 15 items which was designed based on the research questions. Responses to the items were structured on a four-point summated rating scale of "Strongly Agree", "Agree", "Disagree" and Strongly "Disagree" with values of 4,3,2, and 1 respectively.

This instrument was validated by two experts. The reliability of the instrument was established through a test of internal consistency using Cronbach Alpha method. The reliability co-efficient index obtained through the Cronbach Alpha method was 0.76, 0.78 and 0.83 which was considered reliable. Data were collected through the direct delivery method by the researcher and two research assistants. Only 340 copies of the questionnaire administered were completely filled and retrieved: 176 copies from male lecturers and 164 from female lecturers in the 3 Public universities in Rivers state. Research questions were analyzed using mean and standard deviation. Any item from 2.50 and above was considered "Agree" while items below 2.50 were considered "Disagree".

Results

Research Question 1: How effective are AI-powered assessments in enhancing the professional development of academic staff in public universities in Rivers State?

Table 1: Mean and Standard Deviation of Respondents on the Effectiveness of AI-powered Assessments in Enhancing the Professional Development of Academic Staff

S/N	Item	Male Lecturers N (176)			Female Lecturers N (164)		
1	AI-powered assessments provide timely and actionable feedback that improves my teaching practices.	3.20	0.24	Agree	3.12	0.34	Agree
2	The use of AI-powered assessments has significantly enhanced my ability to identify areas for professional growth.	3.51	0.91	Agree	3.70	0.85	Agree
3	AI-powered assessments offer personalized recommendations that are relevant to my professional development needs.	3.62	0.70	Agree	3.69	0.74	Agree

		X	SD	Remark	X2	SD	Remark
4	Since using AI-powered assessments, my confidence in adapting to new teaching strategies has improved.	3.02	0.87	Agree	3.11	0.83	Agree
5	Overall, AI-powered assessments are an effective tool for enhancing the professional development of academic staff in my institution.	3.22	0.76	Agree	3.52	0.90	Agree
	Grand Mean	**3.31**		**Agree**	**3.43**		**Agree**

Data on table 1 showed the mean response and standard deviation of male and female lecturers on effectiveness of AI-powered assessments in enhancing the professional development of academic staff in public universities in Rivers State. Items (1- 5) had mean scores above the criterion mean of 2.50 and which showed that majority of the respondents agreed with most of the items. With grand mean scores of 3.31and 3.41 for male and female lecturers respectively, the answer to research question one is that AI-powered assessments provide timely and actionable feedback that improves teachers' teaching practices, the use of AI-powered assessments has significantly enhanced teachers' ability to identify areas for professional growth, it offers personalized recommendations that are relevant to teachers professional development needs and their confidence in adapting to new teaching strategies has improved.

Research Question 2: What are the challenges to the adoption of AI-powered assessment tools in public universities in Rivers State?

Table 2: Mean and Standard Deviation of Respondents on the Challenges to the Adoption of AI-Powered Assessment Tools in Public Universities in Rivers State

Items		Male Lecturers N (176)			Female Lecturers N (164)		
		X	SD	Remark	X2	SD	Remark
6	Limited access to reliable technological infrastructure is a significant challenge to adopting AI-powered assessment tools in my institution.	2.60	0.83	Agree	2.66	0.71	Agree
7	There is insufficient training and technical support for academic staff on the use of AI-powered assessment tools.	2.63	0.77	Agree	3.52	0.75	Agree

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8	Concerns about data privacy and security hinder the adoption of AI-powered assessment tools in my institution.	2.81	0.84	Agree	3.00	0.78	Agree
9	The high cost of implementing and maintaining AI-powered assessment systems poses a significant barrier to their adoption.	2.64	0.88	Agree	2.70	0.89	Agree
10	Resistance to change and lack of awareness among academic staff are major obstacles to the adoption of AI-powered assessment tools.	3.11	0.71	Agree	3.09	0.80	Agree
	Grand Mean	**2.81**		**Agree**	**3.10**		**Agree**

The result in table 2 showed the responses of male and female lecturers on the challenges to the adoption of AI-powered assessment tools in public universities in Rivers State**.** Items (6- 10) had mean scores above the criterion mean of 2.50 which revealed that majority of the respondents agreed with all the items. With mean scores of 2.81 and 3.10 respectively, the answer to research question two is that the challenges to the adoption of AI-powered assessment tools in public universities in Rivers State are limited access to reliable technological infrastructure, insufficient training and technical support for academic staff on the use of AI-powered assessment tools, concerns about data privacy and security, high cost of implementing and maintaining AI-powered assessment systems and resistance to change and lack of awareness among academic staff.

Research Question 3: What are the perceptions and experiences of academic staff regarding the use of AI-powered assessments for professional development tools in public universities in Rivers State?

Table 3: Perceptions and Experiences of Academic Staff Regarding the Use of AI-Powered Assessments for Professional Development.

Item		Male Lecturers N (176)			Female Lecturers N (164)		
		X	SD	Remark	X	SD	Remark
11	AI-powered assessments are user-friendly and easy to integrate into my professional development activities.	3.78	0.81	Agree	3.67	0.74	Agree

12	Using AI-powered assessments has positively influenced my teaching effectiveness and professional growth.	3.89	0.77	Agree	3.88	0.82	Agree
13	I feel confident in the accuracy and reliability of feedback provided by AI-powered assessment tools.	3.11	0.87	Agree	2.91	0.66	Agree
14	The implementation of AI-powered assessments aligns with my expectations for modernizing professional development practices.	3.11	0.76	Agree	3.03	0.75	Agree
15	My overall experience with AI-powered assessments has been beneficial in identifying and addressing my developmental needs.	3.73	0.90	Agree	3.52	0.82	Agree
	Grand Mean	**3.50**		**Agree**	**3.40**		**Agree**

Data on table 3 showed the mean responses and standard deviation of male and female lecturers on the perceptions and experiences of academic staff regarding the use of AI-powered assessments for professional development tools in public universities in Rivers State. All items in the table are above the criterion mean of 2.50. This implies that majority of the respondents agreed with all the items. With grand mean scores of 3.50 and 3.40 for male and female lecturers respectively, the answer to research question three is that academic staff perceive A-Powered Assessment to be user-friendly and easy to integrate into their professional development activities. They also agreed that AI-powered assessments positively influenced their teaching effectiveness and professional growth. They feel confident in the accuracy and reliability of feedback provided by AI-powered assessment tools and the implementation of AI-powered assessments aligns with lecturers' expectations for modernizing professional development practices.

Discussion of Findings

The result of the finding for research question one revealed that AI-powered assessments provide timely and actionable feedback that improves teachers' teaching practices, the use of AI-powered assessments has significantly enhanced teachers' ability to identify areas for professional growth, it offers personalized recommendations that are relevant to teachers' professional development needs and their confidence in adapting to new teaching strategies has improved. This finding is supported by Zawacki-Richter et al. (2019) which emphasized that

adaptive learning tools and automated feedback mechanisms empower educators to tailor their methods effectively, fostering professional growth. These systems enable instructors to refine their teaching strategies promptly, addressing student needs more effectively. The use of AI-powered assessments significantly enhances educators' ability to identify skill gaps and areas for growth. According to Alonso and Gago (2020), AI analytics can pinpoint strengths and weaknesses in teaching practices, allowing for more focused professional development. These insights not only boost confidence but also align educators' skills with contemporary educational demands.

The result of the findings for research question two revealed that the challenges to the adoption of AI-powered assessment tools in public universities in Rivers State are limited access to reliable technological infrastructure, insufficient training and technical support for academic staff on the use of AI-powered assessment tools, concerns about data privacy and security, high cost of implementing and maintaining AI-powered assessment systems and resistance to change and lack of awareness among academic staff. This finding is supported by the finding of Holmes et al. (2021) which noted that insufficient access to reliable internet and technological tools disproportionately affects universities in developing regions, hindering the implementation of AI systems and limiting their impact on professional development. Similarly, Chen et al. (2020) reported that educators are hesitant to embrace AI tools due to uncertainties about how their data is collected, stored, and used. This lack of trust slows the adoption of AI technologies, despite their potential benefits in educational settings.

The result of the finding for research question three revealed that academic staff perceive A-Powered Assessment to be user-friendly and easy to integrate into their professional development activities. They also agreed that AI-powered assessments positively influenced their teaching effectiveness and professional growth. They feel confident in the accuracy and reliability of feedback provided by AI-powered assessment tools and the implementation of AI-powered assessments aligns with lecturers' expectations for modernizing professional development practices. The findings of the study were supported by Zawacki-Richter et al. (2019) which revealed that intuitive interfaces and seamless integration into existing systems foster positive perceptions among educators, encouraging widespread adoption. Similarly, educators express high confidence in the reliability and accuracy of feedback generated by AI tools. According to Alonso and Gago (2020), the precision of AI-driven insights aligns closely

with educators' expectations, supporting the modernization of teaching practices and enhancing trust in these technologies.

Conclusion

The study explored the roles of AI-powered assessments in enhancing the professional development of academic staff in public universities in Rivers State. The findings revealed that AI-powered assessments provide timely and actionable feedback, significantly improve the ability of academic staff to identify areas for professional growth, and offer personalized recommendations that align with their development needs. However, the study also identified several challenges, including limited access to reliable technological infrastructure, insufficient training, concerns about data privacy, and resistance to change among academic staff. Despite these challenges, academic staff perceived AI-powered assessments as user-friendly and aligned with their expectations for modernizing professional development practices. Overall, the study highlights the transformative potential of AI-powered assessments and underscores the need for strategic interventions to optimize their implementation in higher education.

Recommendations

Based on the findings of the study, it was recommended that:

1. Public universities in Rivers State should prioritize the adoption of AI-powered assessment tools as part of their professional development programmes. Institutions should invest in integrating these tools into their teaching evaluation processes to enable academic staff to access personalized, data-driven feedback that enhances their teaching practices and facilitates continuous professional growth.

2. Government and institutional policymakers should improve technological infrastructure, provide targeted training, and establish clear data security protocols. Investments in internet connectivity, hardware, and technical support are essential, along with professional development workshops to train academic staff in effectively utilizing AI-powered assessment tools. Robust data privacy frameworks should also be developed to build trust and address ethical concerns.

3. Universities should actively promote the use of AI-powered assessment tools by showcasing their benefits and success stories. Institutional leadership should engage academic staff through seminars, testimonials, and case studies that highlight how AI tools improve teaching effectiveness and align with modern professional development practices. This approach will increase acceptance and foster a culture of innovation.

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Managing Educational Resources for Students' Effective Academic Performance in Public Junior Secondary Schools in Obio/Akpor Local Government Area of Rivers State

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Abstract

The purpose of the study was to examine Managing Educational Resources for Students' Effective Academic Performance in Public Junior Secondary Schools in Obio/Akpor Local Government Area of Rivers State. Three Objectives, three research questions and three Hypotheses were raised to guide the study. Descriptive survey research design was used for the study. The population of the study comprised of 3,195 Principal and students in (twenty-seven) Public Junior Secondary Schools in Obio/Akpor LGA. The sample size of the study consists of 355 through the use of Taro Yemen formula. The simple random sampling technique was used for the study. Data for the study were collected by means of questionnaire titled "Managing Educational Resources for Students' Effective Academic Performance (MERSEAPQ)". The PMCTPQ adopted a Modified Likert Rating scale of Vey high extent to Very Low Extent. Cronbach alpha was used to determine the reliability of the instrument. This yielded a high reliability coefficient of 0.83 and 0.85. 355 Copies of questionnaire were distributed, and 313 were retrieved for analysis. Mean and Standard Deviation were used to answer the research questions, while t-test was used to test the hypotheses. The finding shows that financial resources significantly enhance students' academic performance in public junior secondary schools. It was concluded that human resources significantly enhance students' academic performance in public junior secondary schools. Recommendations made amongst others were that the ministry of education and schools in Nigeria should invest more resources in the management and development of their human resources.

Keywords: Educational Resource, Human resources, Material resources and Financial resources

Introduction

Education is an important tool in achieving independence and gender balance in equitable distribution of opportunities (Muthaka & Mwangi, 2022). Every organization has resources that support its activities and engender development. In the educational system, human resources, Material resource and Financial resources exist to support the actualization of its mandate, Nwakpa, 2015; Okeze and Jackson, 2017. Educational resources also include other fundamental materials used in the school to make teaching very easy and learning more meaningful and comprehensible to the learners. Education resources covers all those human resources, Material resource and Financial resources, drawn or photographed, built manually or electronically operated, books and all forms of related materials used in teaching and learning process (NOUN,2006). Education resources includes the teachers in the school, human beings

in the community, real objects, specimen or models, chalk and display boards, school buildings and layout, the community at large and other fundamental materials like pencils, pens, exercise books etc which the learners are expected to have at any point in time to facilitate learning (NOUN, 2009).

Resources are very important in the development of qualitative education. The success or failure of an educational system depends on the quality and quantity of resources made available to it. Resources in any situation imply the money, human and materials available in the realization of organizational goals. The degree of provision and utilization may seriously influence the performance of such an organization. According to Adeogun (2022), educational resource implies the sum total of the input that goes into the educational system. Resource are all the things that are used directly and indirectly for the purposes of supporting, facilitating, influencing or encouraging transmission or acquisition of knowledge, competence, skills and know-how. Ekundayo (2020), viewed resources in education as the totality of everything which the education system needs for its smooth running. These include human, physical, material and financial resources.

Human resources in education are the students, teaching staff, non-teaching staff, bursar, librarian, laboratory attendants, clerks, messengers, mail runners, gatekeepers, gardeners and cooks as well as educational planners and administrators. Material resources include textbooks, charts, maps, audio-visual and electronic instructional materials such as radio, tape recorder, television and video tape recorder. Other category of material resources consists of paper supplies and writing materials such as biro, eraser, exercise books, crayon, chalk, drawing books, notebooks, pencil, ruler, slate, workbook, etc. Financial resources are the monetary inputs available for and expended on the education system. These include money allocated to education by the government grants, PTA levy, and donations from philanthropists and internally generated funds.

Educational resources are those things that can be used to achieve educational objectives. Educational resources are educational inputs that enhance both academic and administrative work in educational organizations which can be tangible and intangible resources. Okendu (2012) views educational resources as the sum total of the input that goes into the educational system. Educational resources are all the things that are used directly and indirectly for the purpose of supporting, facilitating, influencing or encouraging the transmission or acquisition of knowledge, skills, competence and know-how (Ugwulashi, 2012). Managing educational resources effectively for students involves the systematic organization, distribution, and

utilization of human, material, and financial assets to optimize learning outcomes. Human resources, including qualified teachers and support staff, play a pivotal role by directly influencing instructional delivery and student engagement. Material resources, such as textbooks, digital tools, and classroom infrastructure, create an environment conducive to effective learning. Financial resources ensure the availability, maintenance, and expansion of these assets, bridging gaps in educational accessibility and quality.

Students' academic performance can be measured in many ways but the commonly used method is the result of students in public examinations, which is used to pass judgments on the schools and teachers. Ayo (2020) defines students' academic performance as outcome of student's assessments through comprehensive, systematic, cumulative, diagnostic, formative and summative evaluation of what they have gone through in a school setting. Student' performance in school depend to great extent on the management of schools' available resources in terms of human, material and financial resources towards the achievement of educational goals. The school is a complex social institution.

According to Odubuker (2004), and Kaggwa (2003), academic performance is defined as the quality and quantity of knowledge, skills, techniques, positive attitude, behavior and philosophy that students acquire. The ability to achieve is evaluated by marks and grades obtained in a test or examination, at the end of a topic, term, year or education cycle. The authors further assert that the quality of grades and the number of candidates who pass in the various grades determine the level of academic performance of a given class or institution in a given period of a particular examination whether internal or external. It is in the light of this, the researcher tends to investigate Managing Educational Resources for Students' effective academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State.

Managing Educational Resources

In the education field, consideration must be given to the many resources that must be harnessed and judiciously utilized for the accomplishment of the goals and objectives of the educational plan. Adeogun (2003) recognizes the types of resources managed in education to include the following:

Human resources

Human resources in education refer to the individuals involved in delivering, supporting, and administering the teaching and learning process. These include teachers, administrators, counselors, and other staff essential for the functioning of educational institutions. Teachers are central to the learning experience, as they design and deliver curriculum content, assess student

progress, and facilitate skill development. According to UNESCO (2023), the availability of skilled educators directly correlates with student achievement, making the recruitment and retention of qualified teachers a priority for effective education systems. These refer to students, teachers, administrative staff, supervising staff from the ministry of education, guidance counselors, school managers etc.

Material resources

Material resources in education include all physical and digital tools that support teaching and learning. These resources encompass textbooks, laboratory equipment, classroom furniture, technology, and other instructional aids. Properly managed material resources create an engaging and interactive learning environment that facilitates academic success. For instance, interactive whiteboards and tablets enhance student participation and cater to various learning styles (Facilities Management Advisor, 2024). These refers to usable and consumable facilities like time, programmes, policy issues, curriculum, textbooks, maps, time-table, furniture, diaries, registers, lesson notes, chalks, chalkboard, electricity, stationery, biros, pencils etc.

Financial resources

These are the monetary inputs available for and expended on the educational system. These are usually referred to as cost of and expenditure on education. Financial resources in education refer to the monetary inputs necessary for acquiring, managing, and maintaining other resources such as human and material assets. They fund teacher salaries, infrastructure development, instructional materials, and technological advancements. Adequate funding is essential for providing equitable access to quality education. UNESCO (2023) notes that schools with higher per-student spending often report better academic outcomes due to improved resource availability. Budget allocation plays a significant role in managing financial resources effectively. Educational institutions must prioritize spending on critical areas such as staff training, classroom materials, and facility maintenance. Efficient financial management ensures that limited resources are used optimally, minimizing waste while maximizing impact (Facilities Management Advisor, 2024). Transparency and accountability in budget planning and execution further enhance the effectiveness of financial resource use.

Statement of the Problem

Managing Educational Resources can be categorized into human, material and financial resources. Educational resources are essential components of school administration that have to be provided, effectively management and utilization for the achievement of quality School administration and educational goals/objectives. They are necessary for the survival and continuity of the school system which result in the successful teaching-learning outcomes.

Effective management of educational resources—human, material, and financial—is essential for fostering quality learning outcomes. However, in many public secondary schools, particularly in resource-limited settings, human resources such as qualified teachers and administrators are insufficiently distributed or underutilized. This shortfall leads to overcrowded classrooms, reduced individual attention to students, and compromised educational quality. Research has shown that teacher shortages and poor training exacerbate inequities in education, impacting students' ability to achieve their full potential (UNESCO, 2023). Despite the critical role of human resources, many schools lack robust professional development programs to empower educators to manage and maximize available resources effectively.

Material resources, such as textbooks, laboratory equipment, and digital tools, are also inadequately managed in numerous educational systems. Often, there is a mismatch between the resources provided and the curriculum requirements. Schools may face challenges in maintaining or updating these resources, leading to outdated materials that fail to meet modern educational standards. For instance, according to Mendell and Heath (2024), poorly maintained facilities and technological tools not only hinder student engagement but also reduce learning outcomes. Financial resource management is another critical concern. Limited funding, inefficient budget allocation, and corruption often impede the equitable distribution of educational resources. Many schools struggle with maintaining infrastructure or acquiring updated learning tools, while others fail to implement sustainable financial strategies. These issues result in a growing gap between the needs of the educational system and its financial capacity to deliver quality education (Facilities Management Advisor, 2024). Addressing these gaps requires innovative funding approaches, greater accountability, and better coordination among stakeholders to ensure that resources are both available and effectively used. The gap lies in the lack of a comprehensive, integrative framework for managing these three resource categories simultaneously. While studies often focus on individual aspects—such as teacher availability, material resource quality, or financial constraints—they rarely explore the interconnections between human, material, and financial resources and how they collectively influence student outcomes.

Purpose of the Study

The purpose of the study is to examine Managing Educational Resources for Students' effective academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State. Specifically, the objectives of the study are to:

1. To examine the extent to which Human resource enhance Students' effective academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State

2. To examine the extent to which Material resource enhance Students' effective academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State

3. To examine the extent to which Financial resource enhance Students' effective academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State

Research Questions

The researcher developed the following research questions that guided the study.

1. To what extent does Human resource enhance Students' effective academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State

2. To what extent does Material resource enhance Students' effective academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State

3. To what extent does Financial resource enhance Students' effective academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State

Hypotheses

The following null hypotheses were formulated by the researcher to guide the conduct of the study.

1. There is no significant difference between the mean rating of the opinions of teachers and students on the extent Human resource enhance Students' effective academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State.

2.   There is no significant difference between the mean rating of the opinions of teachers and students on the extent Material resource enhance Students' effective academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State.

3.   There is no significant difference between the mean rating of the opinions of teachers and students on the extent Financial resource enhance Students' effective academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State.

Methods

The study adopted a descriptive survey research design which sought to collect data on the opinions of the participants with a view to analyze Managing Educational Resources for Students Effective Academic Performance. The population of the study comprised of 3,195 respondents. The break-down of this population showed 3,180 students and 27 principals respectively. The sample size of the study consists of 355 gotten through the use of Taro Yemen formula. The instrument used for conducting the study was questionnaire titled ''Managing Educational Resources for Students Effective Academic Performance Questionnaire (MERSEAPQ)'', designed by the researchers on a 4-point scale of Very high extent to Very low extent weighted 4,3,2 and 1 respectively. The face validation of the instrument was established by three experts, two in Department of Business Education and one in Measurement and Evaluation. Cronbach alpha was used to determine the reliability of the instrument. This yielded a high reliability coefficient of 0.83 and 0.85 for Parts A and B respectively. Three hundred and Fifty-five (355) copies of the questionnaire were distributed by the researchers together with research assistants, who were briefed on how approach the principal and students in filling the copies of the questionnaire. 313 copies of questionnaire were properly filled and returned, representing 88% returns. The research questions were answered using mean and standard deviation. The mean responses on the research questions were adjudged on the following basis of any mean score that falls below 2.50 will be taken as disagreement and any mean score of 2.50 or above will be taken to indicate agreement. The statistical tool used for the hypotheses testing was the t-test statistical tool and decisions for the hypotheses were made according to the decision rule of t-test.

Results

Research Question 1: To what extent does Human resource enhance Students' effective academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State?

Table 4.1: **Mean and Standard Deviation on the Extent Human resource enhance Students' effective academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State** (N = 313)

S/N	Item Statements	Students = 298			Principals = 15		
		$\bar{x}$	SD	Remarks	$\bar{x}$	SD	Remarks
1	extent do the qualifications of teaching staff enhance students' academic performance	3.12	1.07	High Extent	3.13	0.96	High Extent
2	extent does the adequacy of teaching staff in your school contribute to students' academic achievements	2.66	0.99	Moderate extent	3.13	1.09	High Extent
3	extent does the availability of non-teaching staff support students' academic performance	2.73	1.17	Moderate extent	3.00	1.03	High Extent
	extent do regular staff training programs improve teachers' ability to enhance students' academic outcomes	3.52	0.79	High Extent	2.73	1.12	Moderate extent
5	extent does the use of professional development plans for teachers enhance students' academic performance	2.54	0.91	Moderate extent	3.60	0.71	High Extent
	Total	**14.57**	**4.93**		**15.59**	**4.91**	
	Grand Mean & SD =	**2.91**	**0.98**		**3.11**	**0.98**	

Source: Field Survey, (2024)

Table 4.1 which was for research question one showed that all the items were accepted. The respondents agreed that qualifications of teaching staff enhance students' academic performance. the use of professional development plans for teachers enhance students' academic performance. The confirmation was made with a grand mean of 2.91 and 0.98 while standard deviation of 3.11 and 0.98 for both Students and Principal.

Research Question 2: To what extent does Material resource enhance Students' effective academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State?

Table 4.2: **Mean and Standard Deviation Scores on the Extent Material resource enhance Students' effective academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State (N = 313).**

S/N		Students = 298			Principals = 15		
	Item Statements	$\bar{x}$	SD	Remarks	$\bar{x}$	SD	Remarks
6	availability of sufficient textbooks in your school	3.14	0.98	High Extent	3.27	0.93	High Extent

S/N	Item Statements	$\bar{x}$	SD	Remarks	$\bar{x}$	SD	Remarks
	enhance students' academic performance						
7	adequacy of classroom furniture (e.g., desks, chairs) contribute to students' effective learning	2.61	0.99	Moderate extent	2.53	1.02	Moderate extent
8	extent do well-equipped laboratories (e.g., for science or technology) support students' academic success	3.00	1.05	High Extent	2.87	1.02	Moderate extent
9	extent does the availability of functional libraries with relevant books enhance students' academic outcomes	2.99	0.83	Moderate extent	3.20	0.98	High Extent
10	extent does the provision of modern teaching aids (e.g., projectors, whiteboards) improve teaching and learning processes	2.89	0.89	Moderate extent	2.93	1.18	Moderate extent
	Total	**14.63**	**4.74**		**14.8**	**5.13**	
	Grand Mean & SD =	**2.92**	**0.94**		**2.96**	**1.02**	

Source: Field Survey, 2024

Table 4.2 which was for research question two showed that all the items were accepted. The respondents indicate that availability of sufficient textbooks in your school enhance students' academic performance. well-equipped laboratories (e.g., for science or technology) support students' academic success. The confirmation was made with a grand mean of 2.92 and 2.96 and standard deviation of 0.94 and 1.02 as responses of the respondents on both Students and Principal.

Research Question 3: To what extent does Financial resource enhance Students' effective academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State?

Table 4.3: **Mean and Standard Deviation on how Financial resource enhance Students' effective academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State (N = 313)**

S/N	Item Statements	Teacher = 298			Principal = 15		
		$\bar{x}$	SD	Remarks	$\bar{x}$	SD	Remarks
11	adequate funding for purchasing teaching and learning materials improve students' academic performance	2.85	1.14	Moderate extent	2.87	1.02	Moderate Extent
12	allocation of funds for maintaining school facilities contribute to a conducive learning environment for students	2.88	1.02	Moderate extent	3.07	1.06	High Extent
13	extent does funding for co-curricular activities (e.g., sports, clubs) indirectly	2.90	1.11	Moderate Extent	3.00	0.82	High Extent

	enhance students' academic performance							
14	extent does the availability of funds for teacher training and workshops improve students' academic outcomes	3.01	1.08	High Extent		2.60	1.08	Moderate Extent
15	extent does financial support for providing free or subsidized textbooks affect students' ability to perform academically	3.00	0.97	High Extent		2.40	0.95	Low Extent
	Total	**14.64**	**5.32**			**13.94**	**4.93**	
	Grand Mean & SD =	**2.92**	**1.06**			**2.78**	**0.98**	

Source: Field Survey, 2024

Table 4.3 which was for research question three showed that three items were accepted. The respondents indicate that adequate funding for purchasing teaching and learning materials improve students' academic performance. Allocation of funds for maintaining school facilities contribute to a conducive learning environment for students. The confirmation was made with a grand mean of 3.05 and 0.90 and standard deviation of 2.76 and 0.99 respectively.

Test of Hypotheses

Hypothesis 1: There is no significant difference between the mean rating of the opinions of Students and Principal on the extent Human resource enhance Students' effective academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State.

Table 4: t-test Analysis of Mean Ratings of Students and Principal on the extent Human resource enhance Students' effective academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State.

Respondents	N	$\bar{x}$	SD	Std Error	DF	p	t-cal	t-crit	Decision
Students	298	2.91	0.98						
				0.067	311	0.05	0.8	1.96	Ho failed to reject
Principals	15	3.11	0.98						

Source: Field Survey, 2024

The data in table 4 revealed that the calculated t-test value of Students and Principal mean scores were 2.91 (students) 3.11 (Principals) respectively, while the critical t value was 1.96 at degree of freedom of 311 at 0.05 significance level. Therefore, the null hypothesis was Accepted.

Hypothesis 2: There is no significant difference between the mean rating of the opinions of Students and Principal on the extent Material resource enhance Students' effective

academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State

Table 5: t-test Analysis of Mean Ratings of Students and Principal on the extent Material resource enhance Students' effective academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State

Respondents	N	x̄	SD	Std Error	DF	p	t-cal	t-crit	Decision
Students	298	2.92	0.94						
				0.072	311	0.05	0.15	1.96	Ho failed to reject
Principals	15	2.96	1.02						

Source: Field Survey, 2024

The data in table 5 revealed that the calculated t-test value of Students and Principal mean scores were 2.92 (students) 2.96 (Principals) respectively, while the critical t value was 1.96 at degree of freedom of 311 at 0.05 significance level. Therefore, the null hypothesis was Accepted.

Hypothesis 3: There is no significant difference between the mean rating of the opinions of Students and Principal on the extent Financial resource enhance Students' effective academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State.

Table 6: t-test Analysis of Mean Ratings of Students and Principal on the extent Financial resource enhance Students' effective academic performance in Public Junior secondary schools in Obio/Akpor Local Government Area of Rivers State

Respondents	N	x̄	SD	Std Error	DF	p	t-cal	t-crit	Decision
Students	298	2.92	1.06						
				0.067	311	0.05	0.53	1.96	Ho failed to reject
Principals	15	2.78	0.98						

Source: Field Survey, 2024

The data in table 6 revealed that the calculated t-test value of Students and Principal mean scores were 3.20 (students) 2.99 (Principals) respectively, while the critical t value was 1.96 at degree of freedom of 311 at 0.05 significance level. Therefore, the null hypothesis was Accepted.

Discussion of Findings

The findings reveal that human resources significantly enhance students' academic performance in public junior secondary schools. Adequate teaching staff, both in quantity and quality, is critical in facilitating effective learning. Teachers' professional qualifications and ongoing training programs were found to improve the quality of instruction, aligning with Akpan and Esu's (2021) assertion that well-trained educators significantly influence students' academic achievements. Similarly, the provision of sufficient non-teaching staff, such as library assistants and administrative personnel, indirectly supports the learning environment by allowing teachers to focus more on instruction. These findings corroborate the work of Oluremi (2019), who emphasized that supportive staff create an enabling environment for academic success. Furthermore, the motivation and commitment of teachers, driven by incentives and conducive working conditions, were seen to positively impact students' engagement and performance.

These results are consistent with the theoretical frameworks proposed by Adu and Akinfolarin (2020), who highlighted the relationship between teacher-student interactions and academic success. Effective teacher recruitment, deployment, and professional development programs contribute to reducing teacher-student ratios and ensuring individualized attention, thereby boosting performance. the findings align with Yusuf and Alabi (2022), who noted that human resources play a pivotal role in achieving educational goals. The availability of skilled educators fosters a dynamic and interactive learning atmosphere, essential for effective knowledge transfer. Overall, this study emphasizes the vital role of human resources as a cornerstone for enhancing students' academic outcomes in public junior secondary schools.

The findings demonstrate that material resources play a crucial role in enhancing students' academic performance in public junior secondary schools. Adequate provision of textbooks, functional laboratories, well-maintained classrooms, and access to libraries were identified as key contributors to improved academic outcomes. These align with the views of Ehiaguina and Oladele (2020), who emphasized that the availability of instructional materials significantly improves students' comprehension and retention of lessons. Furthermore, the study highlights the importance of modern teaching aids, such as projectors and multimedia tools, in fostering an engaging and effective learning environment, supporting Adebanjo and Yusuf's (2018) assertion that technological resources improve instructional delivery and student understanding.

In addition, the maintenance of school infrastructure, such as desks, chairs, and ICT facilities, was found to create a conducive learning atmosphere, aligning with the findings of Chika and Ebong (2021), who noted that well-maintained school environments positively impact students' concentration and academic engagement. Access to ICT facilities, in particular, enhances digital literacy and equips students with essential skills for academic success in the modern age. The findings also reinforce Nwankwo and Ugochukwu's (2019) argument that investment in material resources is directly linked to better educational outcomes. Overall, the study highlights that adequate and well-utilized material resources are indispensable for fostering effective teaching and learning processes, ultimately leading to improved academic performance in public junior secondary schools.

The findings reveal that financial resources significantly enhance students' academic performance in public junior secondary schools. Adequate funding ensures the availability of teaching and learning materials, including textbooks, laboratory equipment, and modern teaching aids, which directly impact students' understanding and engagement. This observation aligns with the views of Olaniyi and Ajibade (2020), who asserted that sufficient financial allocation improves the quality of education through the provision of essential resources. Furthermore, the study highlights the role of financial resources in maintaining school infrastructure, such as classrooms and recreational facilities, which foster a conducive learning environment. This supports the findings of Nwosu and Chidiebere (2018), who emphasized the importance of sustained funding in creating an enabling atmosphere for effective learning.

the findings underscore the significance of financial investments in teacher training, extracurricular activities, and ICT resources, which indirectly enhance students' academic performance. For instance, financial capacity to organize professional development programs for teachers was shown to improve instructional quality, aligning with the work of Adedokun and Fapohunda (2019), who linked such programs to better student outcomes. Moreover, school-sponsored activities and scholarships funded by financial resources were found to motivate students and boost their academic achievements. These findings are consistent with Okeke and Adeyemo's (2021) assertion that equitable and efficient use of financial resources ensures access to quality education and academic excellence. Overall, the study highlights that financial resources, when properly allocated and managed, are pivotal to improving students' academic performance in public junior secondary schools.

Conclusion

Based on the findings, it was concluded that human resources significantly enhance students' academic performance in public junior secondary schools. Adequate teaching staff, both in quantity and quality, is critical in facilitating effective learning.

Recommendations

Given the numerous benefits that come from resource management, the researcher recommends:

1.   That the ministry of education and schools in Nigeria should invest more resources in the management and development of their human resources. Also, school heads should be adequately trained on the techniques of resource management.

2.   The government should increase budgetary allocations to public junior secondary schools to ensure sufficient funding for essential academic resources, including textbooks, laboratory equipment, and ICT facilities.

3.   Principals should conduct regular assessments of available material resources and identify gaps that hinder effective learning. They should liaise with the government, NGOs, and community stakeholders to advocate for and secure the necessary resources, ensuring their equitable distribution and efficient utilization within the school.

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Perceived Influence of Management of Early Child Education for Sustainable Development of Public secondary schools in Port Harcourt

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Abstract

This paper examines Perceived influence of Management of Early Childhood Education for Sustainable Development of Public Secondary Schools in Port Harcourt. Three objective, three research questions and three hypotheses were posed to guide the study. The population for the study consisted of 2,238 (Two Thousand Two Hundred and Thirty-Eight) for teachers and students in 17 Public secondary schools in Port Harcourt. The sample size consists of 339 using Taro Yamen formular. Data for the study were collected by means of questionnaire titled early child education for Sustainable Development questionnaire (ECESDQ)'. The instrument adopted a four-point rating scale of High Extent to Very low Extent. Cronbach Alpha method was used for the reliability test which yielded reliability co-efficient of 0.92. 339 Copies of questionnaire were distributed, and Three hundred and twelve (312) were retrieved for analysis. Mean and Standard Deviation were used to answer the research questions, while z-test was used to test the hypotheses. The findings revealed that curriculum content address the diverse needs and backgrounds of students in early childhood education settings. Teacher training programmes in early childhood education improve teachers' skills in creating engaging and age-appropriate learning environments. Based on the findings, conclusion draw that Competent teachers, equipped with the necessary training and resources, are pivotal in fostering students' understanding and commitment to sustainability goals. Furthermore, a well-structured curriculum that integrates sustainability concepts across subjects and aligns with global goals ensures that students are prepared for the complexities of a sustainable future. It recommends that School management should ensure access to modern teaching resources, including digital tools and interactive materials, that support innovative pedagogical methods. Resources such as online learning platforms, sustainability-focused textbooks, and outdoor learning spaces can enhance students' understanding of sustainability issues.

Keywords: Curriculum content, Pedagogical approaches and Teacher's competency

Introduction

Early Childhood Education (ECE) plays a crucial role in laying the foundation for lifelong learning and sustainable development. It encompasses various educational strategies and practices aimed at young children, typically from birth to eight years old. Early childhood education for sustainable development focuses on integrating principles of sustainability into early education to foster a generation that is aware of and committed to environmental, social, and economic sustainability. This approach not only enhances children's cognitive and social skills but also promotes a mindset that values and strives for a sustainable future (UNESCO, 2020).

The management of early childhood education significantly impacts sustainable development in secondary schools by laying a strong foundation for lifelong learning and responsible citizenship. Effective management practices that integrate values like inclusivity, equity, and environmental consciousness foster critical thinking and social responsibility among young learners. Early childhood education (ECE) also promotes essential skills such as collaboration, adaptability, and cultural awareness, which are critical for addressing global challenges. UNESCO emphasizes that well-managed ECE programs enhance children's cognitive and emotional development, preparing them to engage constructively in diverse social and economic systems, ultimately contributing to sustainable societies, United Nations Sustainable Development Group. (2023).

Moreover, linking early education to sustainable development requires integrating community-based approaches and fostering partnerships between stakeholders, including governments, educators, and families. This ensures that educational practices are locally relevant while addressing global goals, such as the United Nations' Sustainable Development Goals (SDGs). Studies have highlighted that children who receive quality early education are more likely to succeed in secondary school and beyond, reducing inequalities and enabling broader societal progress. By focusing on sustainability principles in ECE management, schools create a ripple effect that strengthens secondary education and fosters long-term developmental benefits, UNESCO. (2023).

Early childhood education is any group of programme designed to promote children's intellectual social, emotional, language, physical development and learning from birth to the age of eight (Olowe, Kutelu, and Majebi,2020; Sooter, 2019). Education starts at birth. Since the United Nations (UN) has pointed out ECE (pre-primary education) as a quality aspect of lifelong learning in education globally, teachers should take Education for Sustainable Development (ESD) seriously and develop it to become part of all children's life. Early childhood education should be among the most important elements in young children's education (Richter et al., 2017). The first years of life are the most critical, as the foundation of values, attitudes and personality will guide feelings, behaviour, and thoughts for the rest of their life. Early childhood education and secondary education cater to different developmental stages, the underlying principles of curriculum content, teaching methods, teacher training and professional development are essential at both levels. Adapting these Early childhood education strategies to secondary education can enhance the learning experience by making it more

student-centered, holistic, and developmentally appropriate for adolescents. This approach can help secondary students engage more deeply with their education and develop the skills they need for future success. The curriculum in secondary education should be relevant to the students' interests, cultural backgrounds, and future aspirations. It should encompass a broad range of subjects while also allowing for specialization in areas like science, technology, engineering, arts, and mathematics (STEAM). Teaching methods in secondary schools are pivotal in promoting sustainable development by shaping how students learn, engage, and apply knowledge about sustainability, Rieckmann (2022). Active and participatory teaching methods, such as project-based learning, experiential learning, and collaborative problem-solving, are particularly effective in this regard. These methods encourage students to explore real-world sustainability issues, work together to develop solutions, and reflect on their learning experiences. Teachers in secondary education, like those in early childhood education, benefit from ongoing professional development to keep up with new teaching strategies, technological tools, and subject knowledge. Teacher training and professional development are essential for enhancing sustainable development in secondary schools, as they equip teachers with the knowledge, skills, and pedagogical approaches necessary to teach sustainability effectively, Vare & Scott. (2020).

Sustainable Development is another concept that needs explanation. It is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations General Assembly, 1987:43). Sustainable development could otherwise be called" equitable and balanced", meaning that in order for development to continue indefinitely, it should balance the interest of different groups of people, within the same generations, and do so simultaneously in three major interrelated areas-economic, social and environmental.

Curriculum Content

Curriculum content in secondary schools plays a crucial role in promoting sustainable development by integrating knowledge and practices that foster environmental stewardship, social equity, and economic responsibility, UNESCO. (2020). A well-designed curriculum can empower students to understand and address global challenges such as climate change, resource depletion, and social inequality. Incorporating sustainable development into the curriculum also involves teaching critical thinking, problem-solving, and collaborative skills. These

competencies enable students to analyze complex issues and develop innovative solutions that balance economic, social, and environmental considerations.

Pedagogical Approaches

Pedagogical approaches refer to the strategies and methodologies educators employ to facilitate learning and ensure students grasp knowledge effectively. These approaches are shaped by the goals of education, the needs of students, and the subject matter. Common pedagogical methods include **direct instruction,** where teachers explicitly deliver content, and **inquiry-based learning**, which encourages students to explore, ask questions, and solve problems. Other approaches such as **collaborative learning** emphasize teamwork and peer interaction, fostering a sense of community and improving social-emotional skills. These methods aim to engage students actively, enhancing both critical thinking and motivation (Teacher Strategies, 2024)

Pedagogical approaches in early childhood education (ECE) emphasize creating learning environments that nurture children's cognitive, social, and emotional development. Vygotsky's **sociocultural theory** highlights the importance of social interaction and scaffolding, suggesting that children learn best when supported by educators and peers within their zone of proximal development (Vygotsky, 1978). This view is complemented by Dewey's focus on experiential learning, which emphasizes hands-on activities and encourages children to learn through interaction with their environment (Dewey, 1938). These theories underline the value of active, play-based learning where children explore, ask questions, and construct knowledge in meaningful ways.

Other educators advocate for **Montessori's child-centered approach**, which emphasizes autonomy, sensory learning, and individualized instruction tailored to each child's developmental stage (Montessori, 1964). Similarly, Reggio Emilia's philosophy stresses collaboration, creative expression, and project-based learning, viewing children as capable individuals who co-construct knowledge with peers and educators (Malaguzzi, 1996). Contemporary practices also integrate **inclusive and multicultural pedagogies**, ensuring that ECE programs address diverse cultural and developmental needs to foster equity and sustainability in education (UNESCO, 2023).

Teacher competency

Teacher competency in early childhood education encompasses the knowledge, skills, and dispositions necessary for teachers to effectively support the developmental needs of young

children. These competencies include creating inclusive environments, fostering social-emotional development, and applying culturally responsive teaching practices. According to Han and Kemple (2006), teachers' ability to cultivate a positive social climate enhances children's learning by fostering inclusivity and respect. This includes creating diverse group activities that promote teamwork and recognizing cultural differences to build tolerance and respect. These strategies support not only academic readiness but also social and emotional growth, helping children develop confidence and a sense of belonging. The importance of reflective practices among educators. For example, teacher preparation programs encourage candidates to reflect on how their upbringing influences interactions with children and families. This reflection aids in tailoring instruction for diverse learners, including those with disabilities or dual-language needs. Effective teacher training programs focus on aligning values with practices, preparing educators to handle varied cultural and social dynamics in early childhood settings

Statement of Problems

Early childhood education (ECE) plays a crucial role in laying the foundation for sustainable development. The influence of early childhood education on sustainable development has become a critical concern, particularly regarding on curriculum content, pedagogical approaches, and teacher competency—impact its effectiveness. Despite global efforts to integrate sustainability into education, many early childhood programs in public schools fail to provide comprehensive and relevant curriculum content that prepares young learners to address future environmental, social, and economic challenges. Curricula often lack a holistic approach to sustainability, limiting children's ability to develop critical thinking and problem-solving skills needed for fostering sustainable practices (UNESCO, 2021).

The pedagogical approaches employed in early childhood education frequently fall short of fostering engagement with sustainability concepts. Many educators rely on traditional methods that do not adequately encourage experiential learning or critical inquiry, which are vital for instilling sustainable values. Research has shown that innovative teaching strategies, such as project-based and culturally responsive learning, can significantly enhance students' understanding of sustainability (Blumenfeld et al., 1991; Gay, 2002). However, the implementation of such methods is often constrained by limited resources and inadequate training.

Teacher competency is another significant challenge. In many cases, educators lack the professional training and ongoing development needed to effectively integrate sustainability concepts into their teaching practices. Teachers' limited knowledge of education for sustainable development (ESD) diminishes their ability to inspire and prepare students to become active participants in sustainable initiatives. This gap highlights the urgent need for targeted investments in teacher training programs and professional development opportunities to enhance their skills in delivering sustainability-focused education (Darling-Hammond et al., 2020).

Purpose of the Study

The main aim of this study is to determine Perceived influence of Management of Early Childhood Education for Sustainable Development of Public Secondary Schools in Port Harcourt. Specifically, the study seeks to:

1. Determine the extent to which Curriculum content design influence Sustainable Development of Public secondary schools in Port Harcourt.

2. Determine the extent to which pedagogical approaches influence Sustainable Development of Public secondary schools in Port Harcourt.

3. Determine the extent teacher's competency influence Sustainable Development of Public secondary schools in Port Harcourt.

Research Questions

The following research questions are posed to guide the study:

1. To what extent does Curriculum content design influence Sustainable Development of Public secondary schools in Port Harcourt?

2. To what extent does pedagogical approaches influence Sustainable Development of Public secondary schools in Port Harcourt?

3. To what extent does teacher's competency influence Sustainable Development of Public secondary schools in Port Harcourt?

Hypotheses

The following hypotheses are formulated and were tested at 0.05 level of significance:

1. There is no significant difference between teachers and students in their mean rating on the extent to which Curriculum content design influence Sustainable Development of Public secondary schools in Port Harcourt.

2.   There is no significant difference between teachers and students in their mean rating on the extent to which pedagogical approaches influence Sustainable Development of Public secondary schools in Port Harcourt.

3.   There is no significant difference between teachers and students in their mean rating on the extent to which teacher's competency influence Sustainable Development of Public secondary schools in Port Harcourt.

Methodology

Descriptive survey research design was adopted for this study. The design was adopted because the study involves drawing generalization based on analysis of data that would be collected from a fraction of a large population. The area covered by this study is Rivers State. This study focuses its attention on public secondary schools, in Port Harcourt LGA. The population of the study consisted of 2,238 (Two Thousand Two Hundred and Thirty-eight) teachers and students in 17 Public secondary schools in Port Harcourt. 2,204 students and 34 teachers respectively. The sample size consisted of 339 using Taro Yamen formular, out of the total population of 2,238. The simple random sampling technique was used for the study hence; all the respondents were given equal chance and opportunity. The instrument used for data collection is a self – structured questionnaire developed by the researcher titled "Early child education for sustainable development (ECESDQ). The option scale that is used for the instrument is 4-point rating scale of Very High Extent (VHE – 4points), High Extent (HE – 3points), Moderate Extent (ME – 2points), and Low Extent (LE- 1point). The research instrument was face and content validated by three (3) experts in the field of Education. Two experts from Educational Management including one Measurement and Evaluation expert. In order to establish the reliability of the instrument, Cronbach Alpha method was used. A reliability coefficient of 0.84 was obtained, which the researcher felt it was high enough and that the instrument was therefore, deemed reliable. Three Hundred and thirty-nine (339) copies of questionnaire was administered to the respondents by the researcher and two (2) trained research assistants, three hundred and twelve (312) was retrieved for the analysis. The data gathered were analyzed using mean and standard deviation to answer the research questions. z-test was used to test the hypotheses at 0.05 level of significance

Result

Research Question 1: To what extent does Curriculum content design influence Sustainable Development of Public secondary schools in Port Harcourt?

Table 4.1: **Mean and Standard Deviation on the extent to which Curriculum content design influence Sustainable Development of Public secondary schools in Port Harcourt** **(N = 312)**

S/N	Item Statements	Teacher = 34			Student = 278		
		$\bar{x}$	SD	Remarks	$\bar{x}$	SD	Remarks
1	curriculum content in early childhood education cover key developmental areas, such as cognitive, social, and emotional growth	3.59	0.73	Very High Extent	3.33	0.89	High extent
2	early childhood education curriculum incorporates age-appropriate activities and materials that engage young learners	3.44	0.77	High Extent	3.19	0.93	High Extent
3	curriculum content addresses the diverse needs and backgrounds of students in early childhood education settings	3.59	0.84	Very High Extent	3.23	1.05	High extent
4	early childhood education curriculum integrates foundational skills such as literacy and numeracy in a way that is suitable for young children	3.44	0.74	High extent	3.66	0.61	Very High Extent
5	curriculum content promotes the development of critical thinking and problem-solving skills in early childhood education	3.47	0.78	High Extent	3.64	0.59	Very High Extent
	Grand Mean =	**3.50**	**0.77**	Very High Extent	**3.41**	**0.81**	Very High extent

The results in table 1 show that all the items on the table were rated to be very high extent by the Teachers and Students. It is generally concluded that curriculum content in early childhood education cover key developmental areas, such as cognitive, social, and emotional growth to be Very high extent. The confirmation was made with a grand mean of 3.50 and standard deviation of 0.77 for teachers while that of students were 3.41 and 0.81 for mean and standard deviation.

Research Question 2: To what extent does pedagogical approaches influence Sustainable Development of Public secondary schools in Port Harcourt?

Table 4.2: **Mean and Standard Deviation on the extent to which pedagogical approaches influence Sustainable Development of Public secondary schools in Port Harcourt** **(N = 312)**

	Teacher = 34	Student = 278

S/N	Item Statements	$\bar{x}$	SD	Remarks	$\bar{x}$	SD	Remarks
1	extent incorporate play-based learning to foster creativity and critical thinking among students for sustainable development	3.62	0.73	Very High extent	3.18	1.04	Very High extent
2	extent project-based learning in your classroom enhance students' ability to solve real-world sustainability challenges	3.32	0.87	Very High extent	3.47	0.79	Very High extent
3	extent experiential learning activities (e.g., hands-on projects or fieldwork) helpful in understanding sustainability concepts	3.50	0.78	Very High extent	2.97	1.12	High extent
4	teachers' instructional methods encourage critical thinking about environmental, social, and economic sustainability issues	3.62	0.59	Very High extent	3.46	0.70	Very High extent
5	school curriculum integrates pedagogical approaches that connect classroom learning to global sustainable development goals	3.32	0.87	Very High extent	3.66	0.62	Very High extent
	Grand Mean & SD =	**3.48**	**0.76**		**3.34**	**0.85**	

The results in Table 2 show that one of the items on the table were rated to a Very high extent (that is, item 1,2,4, and 5) while 3 of the items were rated to a high extent (that is, item 3). It is therefore concluded that teachers' instructional methods encourage critical thinking about environmental, social, and economic sustainability issues. School curriculum integrate pedagogical approaches that connect classroom learning to global sustainable development goals. The confirmation was made with a grand mean of 3.48 and 0.76 while standard deviation of 3.34 and 0.85 for both Teacher and students.

Research Question 3: To what extent does teacher's competency influence Sustainable Development of Public secondary schools in Port Harcourt?

Table 4.3:   Mean and Standard Deviation on the extent to which teacher's competency influence Sustainable Development of Public secondary schools in Port Harcourt   (N = 312).

S/N	Item Statements	Teacher = 34			Student = 278		
		$\bar{x}$	SD	Remarks	$\bar{x}$	SD	Remarks
1	integrate sustainable development concepts into your lesson plans promote environmental awareness	3.38	0.87	Very High extent	3.22	0.86	Very High extent

2	professional training prepares you to teach sustainable practices effectively in the classroom	3.09	1.04	Very High extent	3.38	0.94	Very High extent
3	teachers encourage discussions and critical thinking about sustainability challenges and solutions	3.74	0.66	Very High extent	3.37	0.87	Very High extent
4	teachers' ability to use real-world examples improve your understanding of sustainability practices	3.26	0.95	Very High extent	2.59	0.98	High Extent
5	teachers' communication and interpersonal skills inspire you to actively engage in sustainable development activities	3.65	0.64	Very High extent	3.55	0.70	Very High extent
	Grand Mean =	**3.42**	**0.83**		**3.22**	**0.87**	

The result in table 3 shows that item 1,2,3 and 5 on the table were rated to a Very High extent while only item 4 was rated to a high extent. The grand mean of 3.42 and 3.22 brings the conclusion that teachers' communication and interpersonal skills inspire you to actively engage in sustainable development activities. Integrate sustainable development concepts into your lesson plans promote environmental awareness to a High extent

Test of Hypotheses

Hypothesis 1: There is no significant difference between teachers and students in their mean rating on the extent to which Curriculum content design influence Sustainable Development of Public secondary schools in Port Harcourt.

Table 4.5: z-test Analysis on the mean response of teachers and students in their mean rating on the extent to which Curriculum content design influence Sustainable Development of Public secondary schools in Port Harcourt.

Respondents	N	$\bar{x}$	SD	Std Error	df	A	z-cal	z-crit	Decision
Teacher	34	3.50	0.77						
				0.019	310	0.05	0.69	1.96	Ho failed to reject
Students	278	3.41	0.81						

Table 5, the z–calculated value of 0.69 is less than z–critical value of 1.96 at 0.05 levels of significance and 310 degree of freedom. The null hypothesis is accepted. Indicating there is no significant difference in the mean responses of teachers and students in their mean rating on the extent to which Curriculum content improve sustainable development**.**

Hypothesis 2: There is no significant difference between teachers and students in their mean rating on the extent to which pedagogical approaches influence Sustainable Development of Public secondary schools in Port Harcourt.

Table 4.6: **z-test Analysis on the mean responses of teachers and students in their mean rating on the extent to which pedagogical approaches influence Sustainable Development of Public secondary schools in Port Harcourt.**

Respondents	N	$\bar{x}$	SD	Std Error	df	A	z-cal	z-crit	Decision
Teacher	34	3.48	0.76						
				0.019	310	0.05	1.07	1.96	Ho failed to reject
Students	278	3.34	0.85						

From the z – test in Table 6, the calculated value is 1.07 while the z – critical value is 1.96 at 0.05 level of significance. The z – calculated value is lower than z– critical value, the null hypothesis is therefore accepted. Indicating there is no significant difference in the mean responses of teachers and students in their mean rating on the extent to which pedagogical approaches influence Sustainable Development of Public secondary schools in Port Harcourt.

Hypothesis 3: There is no significant difference between teachers and students in their mean rating on the extent to which teacher's competency influence Sustainable Development of Public secondary schools in Port Harcourt.

Table 4.7: z-test Analysis on the mean responses of teachers and students in their mean rating on the extent to which teacher's competency influence Sustainable Development of Public secondary schools in Port Harcourt.

Respondents	N	$\bar{x}$	SD	Std. Error	df	A	z-cal	z-crit	Decision
Teacher	34	3.42	0.83						
				0.022	310	0.05	1.42	1.96	Ho failed to reject
Students	278	3.22	0.87						

Table 9, the z–calculated value of 1.42 is less than z–critical value of 1.96 at 0.05 levels of significance and 310 degrees of freedom. The null hypothesis is accepted. Indicating there is no significant difference in the mean responses of teachers and students in their mean rating on the extent to which teacher's competency influence Sustainable Development of Public secondary schools in Port Harcourt.

Discussion of Findings

The Discussion of findings were done according to each research question posed in chapter one as thus:

The findings from all the items in the questionnaire in general, and the summary of the findings in particular are discussed in this section. The discussion is presented according to the three research questions posed. Findings of the study in Research Question 1 which was analyzed and presented in Table 1, curriculum content in early childhood education cover key developmental areas, such as cognitive, social, and emotional growth to a be Very high extent. This finding concurs with the assertion Adekomi (2017) opines that **Curriculum content** is the subjects, topics, and materials that students are taught, which must be carefully designed to meet the developmental needs and learning objectives of the students.

Findings of the study in Research Question 2 which was analyzed and presented in Table 2, teachers' instructional methods encourage critical thinking about environmental, social, and economic sustainability issues. School curriculum integrate pedagogical approaches that connect classroom learning to global sustainable development goals to a be Very high extent. This finding concurs with the assertion Darling-Hammond et al., (2020), Pedagogical approaches play a pivotal role in improving sustainable development in public secondary schools, as they shape students' understanding and engagement with sustainability concepts. Project-based learning (PBL), for instance, encourages students to tackle real-world challenges related to environmental, social, and economic sustainability. In line with the view of Blumenfeld et al. (2019), Project-based learning fosters critical thinking, collaboration, and problem-solving skills, equipping students with the ability to address sustainability issues practically. (Kolb, 2004) stated that experiential learning, which emphasizes hands-on activities and fieldwork, has been shown to deepen students' appreciation of sustainable practices by connecting theoretical knowledge with real-life applications.

Gay (2002) asserts that this method allows educators to address diverse cultural backgrounds, fostering a sense of belonging and respect among students. By incorporating local and global perspectives on sustainability, this approach helps students understand the interconnectedness of societal and environmental challenges. Additionally, the integration of digital technologies in teaching enhances access to global knowledge on sustainability, aligning with the findings of Sharma and Monteiro (2021), who emphasize the importance of technology in modern pedagogical practices to advance education for sustainable development.

Findings of the study in Research Question 3 which was analyzed and presented in Table3, teachers' communication and interpersonal skills inspire you to actively engage in sustainable

development activities. Integrate sustainable development concepts into your lesson plans promote environmental awareness to a be Very high extent. This finding concurs with the assertion Darling-Hammond et al., (2020) Teachers' competency is critical in enhancing sustainable development in public secondary schools, as their skills and knowledge directly influence students' understanding of sustainability concepts. Teachers who demonstrate high competence in integrating sustainability into their pedagogy help foster students' critical thinking, environmental awareness, and social responsibility. In view of Shulman (1987), effective teaching requires a deep understanding of subject content, pedagogical strategies, and the ability to make the material relevant to real-world contexts. This multidimensional competency empowers teachers to instill sustainable values and practices in students, ensuring they are prepared to address complex global challenges.

As highlighted by Darling-Hammond et al. (2020), professional training equips teachers with innovative teaching strategies, such as project-based learning and interdisciplinary approaches, which are essential for addressing sustainability goals. Teachers with strong communication skills and cultural awareness further create inclusive learning environments that respect diversity and promote equity, crucial pillars of sustainable development. This aligns with findings by UNESCO (2021), which emphasize that teacher competency is pivotal in achieving education for sustainable development (ESD) by fostering knowledge, skills, and attitudes necessary for building a sustainable future.

Conclusion

Based on the findings, it was concluded that curriculum content in early childhood education cover key developmental areas, such as cognitive, social, and emotional growth. Sustainable development in public secondary schools can be significantly advanced through targeted improvements in pedagogical approaches, teacher competencies, and curriculum content. Effective pedagogical strategies such as project-based and experiential learning promote critical thinking and problem-solving skills essential for addressing real-world sustainability challenges. Competent teachers, equipped with the necessary training and resources, are pivotal in fostering students' understanding and commitment to sustainability goals. Furthermore, a well-structured curriculum that integrates sustainability concepts across subjects and aligns with global goals ensures that students are prepared for the complexities of a sustainable future. To achieve these outcomes, the collaborative efforts of governments, school management, educators, and other stakeholders are crucial. By prioritizing investment in professional

development, innovative teaching methods, and curriculum reforms, education systems can empower the next generation to contribute effectively to sustainable development. This integrated approach lays the foundation for creating informed, responsible citizens capable of driving positive change in their communities and beyond.

Recommendations

1. The government should ensure the curriculum aligns with the United Nations' Sustainable Development Goals (SDGs), particularly Goal 4.7, which emphasizes education for sustainable development.

2. School management should ensure access to modern teaching resources, including digital tools and interactive materials, that support innovative pedagogical methods. Resources such as online learning platforms, sustainability-focused textbooks, and outdoor learning spaces can enhance students' understanding of sustainability issues.

3. The government and school management should invest in providing schools with updated teaching materials, technological tools, and access to sustainability-related resources. This includes creating digital repositories, offering teaching guides on sustainability topics, and forming partnerships with environmental organizations for hands-on teacher training

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Artificial Intelligence in Educational Management for Enhanced Administrative Effectiveness in Rivers State Universities.

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Abstract

This study examines the role of artificial intelligence (AI) in enhancing administrative effectiveness within Rivers State Universities. The study had 3 objectives and was guided by 3 research questions and 3 hypotheses. A descriptive survey design was employed. The population of the study was 48 Educational Management administrators from two Rivers State-owned universities (Rivers State University (RSU) and Ignatius Ajuru University of Education, IAUE). The population included the Head of Department, a secretary and the assistant and exams and record officers from the Department of Educational Management of the aforementioned Rivers State Universities. The sample size of the study was 48 respondents which comprised of 19 male and 29 female administrators. The census sampling technique was adopted for the study to include the whole population into the sample due to its manageable size. Data was collected through a structured questionnaire, titled Artificial Intelligence in Educational Management for Enhanced Administrative Effectiveness in Rivers State Universities Questionnaire (AIEMAERSUQ), rated on a 5-point Likert scale. The instrument's reliability was confirmed with a Cronbach alpha coefficient of 0.91. Responses were analysed using mean and standard deviation for research questions, while z-tests were applied to test hypotheses at a 0.05 significance level. The findings reveal that AI tools, such as machine learning, natural language processing (NLP), and automated scheduling systems, significantly contribute to improving administrative processes, decision-making, and resource management in the universities. Both male and female administrators shared similar views on AI's positive impact, demonstrating consensus across genders. The study recommends increased AI adoption, continuous training for administrators, and customization of AI tools to align with the specific administrative needs of Rivers State universities to further enhance effectiveness.

Keywords: Artificial Intelligence, Machine learning, Natural language processing (NLP), Automated scheduling systems, Educational Management, and Administrative Effectiveness.

Introduction

Artificial Intelligence (AI) is rapidly reshaping various sectors, including education, where its integration into management processes is driving significant improvements in administrative effectiveness. Artificial Intelligence (AI) refers to the simulation of human intelligence processes by machines, particularly computer systems. These processes include learning (the acquisition of information and rules for using it), reasoning (the use of rules to reach approximate or definite conclusions), and self-correction. AI encompasses a wide range of technologies, including machine learning, natural language processing, robotics, and computer vision, enabling systems to perform tasks that typically require human intelligence, such as

understanding natural language, recognizing patterns, and making decisions (Russell &Norvig, 2020).

According to Lee and Johnson (2019), AI offers educational institutions the ability to automate routine tasks, optimize resource allocation, and enhance decision-making, which in turn promotes operational efficiency. Educational Management is the process of planning, organizing, leading, and controlling the resources and activities of educational institutions to achieve their goals effectively and efficiently. This field encompasses various functions, including curriculum development, staff management, student services, budgeting, and policy implementation (Bush, 2016). Educational management aims to enhance the quality of education and ensure that institutions operate smoothly, fostering an environment conducive to learning and growth for both students and staff (Torres & Garza, 2022).By automating administrative duties such as attendance tracking, grading, and scheduling, AI allows educational managers to focus on more strategic initiatives that directly impact student success and institutional growth and hence results in administrative effectiveness. Administrative Effectiveness refers to the degree to which administrative processes and practices achieve their intended goals efficiently and productively. It encompasses various factors, including the ability to streamline operations, improve communication, allocate resources judiciously, and adapt to changing circumstances (Cameron & Quinn, 2015). Effective administration is characterized by the successful implementation of policies and procedures that enhance organizational performance, support decision-making, and contribute to the overall success of an institution or organization (Miller & Kean, 2023).

Similarly, in the view of Kearney and Thompson (2021), AI-driven tools such as predictive analytics and automated scheduling systems have proven invaluable in streamlining the effectiveness of administrative functions, from student enrollment management to staff allocation. These tools not only reduce the time and effort required to perform these tasks but also increase accuracy and consistency, thereby minimizing human error and enhancing overall administrative performance.

The increasing complexity of educational administration, driven by rising student populations, diverse learning needs, and the demand for personalized educational experiences, has made the need for effective management systems more urgent (Torres & Garza, 2022). As educational institutions expand and diversify, managing vast amounts of data and coordinating various administrative activities becomes increasingly challenging. AI technologies, as well as machine learning (ML), natural language processing (NLP), and Automated scheduling systems, provide

educational managers with sophisticated tools for real-time data analysis, predictive modeling, and improved communication (Patel & Singh, 2020). For instance, machine learning algorithms can analyze student performance data to identify trends and predict future outcomes, enabling proactive interventions. Natural language processing facilitates enhanced communication through AI-powered Chabot that handle routine inquiries, freeing up administrative staff to address more complex issues. Furthermore, decision support systems leverage AI to provide actionable insights, aiding administrators in making informed decisions that align with the institution's strategic goals.

However, while the potential of AI in educational management is vast, it is not without challenges. McKay and Brooks (2023) argue that issues such as data privacy, ethical considerations, and the need for human oversight remain critical concerns in the widespread adoption of AI technologies. Data privacy is paramount, as educational institutions handle sensitive information about students, staff, and operations. Ensuring that AI systems comply with data protection regulations and maintain the confidentiality and security of data is essential. Ethical considerations also arise, particularly regarding the transparency and fairness of AI algorithms. There is a risk of bias in AI systems, which can lead to unequal treatment of students or staff if not properly addressed. Furthermore, the need for human oversight is crucial to balance AI's operational efficiency with the human element of educational management. Administrators must ensure that AI complements rather than replaces human judgment, preserving the integrity and personal touch that are vital to the educational experience.

Furthermore, integrating AI into educational management requires significant investment in technology infrastructure and training. Educational institutions must allocate resources to acquire and maintain AI systems, as well as to train staff members to effectively use these technologies. According to Martinez and Lee (2022), successful AI implementation also involves fostering a culture of innovation and adaptability within the institution, encouraging stakeholders to embrace new technologies and workflows. Additionally, collaboration between educators, administrators, and technology experts is essential to ensure that AI solutions are tailored to meet the specific needs of the institution and its community.

Artificial intelligence (AI) is increasingly being recognized for its potential to transform educational management by enhancing administrative effectiveness. Various types of AI have been adopted in educational settings to streamline processes, improve decision-making, and optimize resource allocation.

Machine learning (ML) is one of the primary AI technologies used in educational management. According to Wong and Li (2020), ML algorithms can analyze vast amounts of student data to predict academic outcomes, enabling administrators to implement early interventions for students at risk of failure. **Predictive analytics**, a subset of ML, is also crucial for resource management, as noted by Johnson et al. (2019), where it is used to predict enrolment trends and allocate resources efficiently. Machine Learning (ML), a pivotal subset of Artificial Intelligence (AI), has significantly influenced various sectors, including education. In the context of educational management, ML applications are instrumental in enhancing administrative effectiveness by automating processes, optimizing resource allocation, and providing data-driven insights for informed decision-making. According to Lee and Johnson (2019), ML empowers educational institutions to handle large volumes of data efficiently, thereby improving operational workflows and strategic planning. Similarly, in the view of Patel and Singh (2020), ML algorithms facilitate the analysis of complex datasets to uncover patterns and trends that traditional methods might overlook, thereby enabling more accurate forecasting and proactive management.

One of the primary applications of ML in educational management is predictive analytics, which involves analyzing historical and real-time data to forecast future outcomes. According to Wong and Li (2020), ML models can predict student academic performance by evaluating factors such as attendance, participation, and previous grades. This predictive capability allows administrators to identify at-risk students early and implement targeted interventions to improve retention rates. For instance, Johnson et al. (2019) demonstrated that ML-based predictive models increased student retention by 15% in a mid-sized university through timely support measures.

ML also plays a crucial role in automating routine administrative tasks, thereby reducing the administrative burden on staff and increasing overall efficiency. As highlighted by Kearney and Thompson (2021), ML-driven automation tools can manage tasks such as enrolment processing, scheduling, and resource allocation with minimal human intervention. Similarly, an empirical study by Martinez and Lee (2022) found that implementing ML-based scheduling systems reduced scheduling conflicts by 30% and improved resource utilization by 25% in higher education institutions.

Effective resource allocation is essential for the smooth operation of educational institutions. ML algorithms assist in optimizing the distribution of resources such as faculty, classrooms,

and financial budgets. According to Garcia and Martinez (2023), ML models analyze historical usage patterns and current demand to make data-driven recommendations for resource allocation. An empirical study by Smith and Davis (2021) revealed that ML-based resource optimization led to a 20% reduction in operational costs and a 10% increase in resource utilization efficiency in a large university setting.

ML facilitates the personalization of learning experiences and support services, enhancing the overall educational environment. By analyzing individual student data, ML algorithms can tailor educational content, recommend suitable courses, and provide personalized support services. Similarly, Ko and Lee (2022) emphasized that ML-powered recommendation systems significantly improved student satisfaction and engagement by offering customized learning paths. An empirical investigation by Wilson and Clark (2023) demonstrated that personalized learning initiatives driven by ML resulted in a 12% improvement in student academic performance and a 15% increase in course completion rates.

ML enhances decision-making processes by providing accurate and timely data insights. According to Patel and Singh (2020), ML-driven decision support systems enable administrators to make informed decisions based on comprehensive data analysis, leading to more effective strategic planning and policy formulation. Furthermore, these systems reduce the reliance on intuition-based decisions, thereby minimizing biases and errors.

The automation of administrative tasks through ML leads to significant improvements in efficiency and productivity. As Lee and Johnson (2019) noted, automating repetitive tasks allows administrative staff to focus on more strategic and value-added activities, thereby enhancing overall productivity. Similarly, Kearney and Thompson (2021) found that ML-driven automation reduced task completion times by up to 40%, enabling faster and more efficient administrative operations.

ML applications contribute to enhanced student support and engagement by providing personalized services and timely interventions. Torres and Garza (2022) highlighted that ML algorithms can identify student needs and preferences, enabling institutions to offer tailored support services that improve student satisfaction and academic success. Furthermore, personalized learning experiences foster a more engaging and supportive educational environment, as evidenced by the findings of Ko and Lee (2022).

Smith and Davis (2021) conducted an empirical study at the University of California, where ML-based predictive analytics were implemented to monitor student performance and identify

those at risk of dropping out. The study found that the intervention strategies informed by ML predictions led to a 15% increase in student retention rates over two academic years. This case study underscores the effectiveness of ML in enhancing student support and retention through data-driven insights. Brown and Green (2022) explored the implementation of ML-driven scheduling systems at Stanford University. Their empirical research demonstrated that the optimized scheduling led to a 20% reduction in scheduling conflicts and a 25% improvement in resource utilization. The study highlights how ML can streamline administrative processes and enhance the efficiency of resource management in higher education institutions.

Wilson and Clark (2023) examined the impact of ML-powered personalized learning systems at the Massachusetts Institute of Technology (MIT). Their empirical study revealed that personalized learning paths increased student academic performance by 12% and course completion rates by 15%. This research illustrates the potential of ML to enhance educational outcomes by providing tailored learning experiences that meet individual student needs.

Looking ahead, the role of ML in educational management is poised to expand, driven by advancements in AI technologies and increasing data availability. Hernandez and Lopez (2024) suggest that future developments in deep learning and advanced data analytics will enable even more sophisticated applications of ML in education, such as real-time adaptive learning environments and comprehensive institutional performance monitoring. Furthermore, the integration of ML with other emerging technologies, such as the Internet of Things (IoT) and block chain, could create new opportunities for enhancing educational management through more interconnected and secure systems (Garcia & Martinez, 2023).

Natural language processing (NLP) is another significant AI application in educational management. In the view of Torres and Garza (2021), NLP tools can automate administrative tasks such as managing emails, answering routine student queries, and handling documentation, freeing up time for more strategic tasks. Similarly, Koi and Lee (2022) highlight that NLP-powered catboats are being used to enhance communication between students and the administration, improving the overall efficiency of information dissemination. Natural Language Processing (NLP), a crucial component of Artificial Intelligence (AI), is transforming educational management by enhancing administrative effectiveness through improved communication, automated processes, and data-driven insights. NLP encompasses various techniques that enable machines to understand, interpret, and generate human language, thereby facilitating more efficient interactions between educational stakeholders. According to Zhang

and Zhao (2021), the integration of NLP into educational management systems allows institutions to streamline administrative tasks, improve student support services, and enhance decision-making processes.

NLP applications are instrumental in automating various administrative tasks within educational institutions. According to Kearney and Thompson (2021), NLP-driven catboats can handle routine inquiries from students, such as admissions processes, course information, and scheduling. This automation significantly reduces the workload on administrative staff, allowing them to focus on more complex and strategic tasks. Furthermore, Patel and Singh (2020) found that institutions using NLP catboats reported a 30% reduction in response time for student inquiries, improving overall efficiency in administrative operations.

In the view of Lee and Johnson (2019), NLP technologies can facilitate better communication between students, faculty, and administrative staff. For instance, NLP can analyze communication patterns and identify areas where misunderstandings may occur, allowing institutions to provide targeted training and resources. Similarly, Garcia and Martinez (2023) emphasize that NLP can assist in translating documents and communications into multiple languages, promoting inclusivity in diverse educational environments.

NLP enables educational administrators to extract valuable insights from unstructured data, such as feedback from surveys, student evaluations, and social media interactions. According to Torres and Garza (2022), sentiment analysis—a key application of NLP—can gauge student satisfaction and identify potential issues within the educational environment. This capability empowers institutions to make informed decisions based on real-time feedback. An empirical study by Smith and Davis (2021) demonstrated that universities using NLP for sentiment analysis could proactively address student concerns, resulting in a 15% improvement in overall student satisfaction.

The implementation of NLP technologies can significantly improve the efficiency of administrative processes. According to Wong and Li (2020), NLP applications can automate the processing of written documents, such as applications and reports, reducing the time required for manual review. Additionally, NLP can assist in categorizing and prioritizing tasks, allowing administrators to focus on high-impact areas. An empirical study by Brown and Green (2022) found that institutions implementing NLP-driven document processing systems reduced processing times by 40%, leading to faster decision-making and improved service delivery.

NLP contributes to enhanced student support services by enabling personalized communication and timely assistance. In the view of Ko and Lee (2022), NLP can analyze individual student interactions and preferences to provide tailored support. For instance, institutions can use NLP to recommend resources or services based on a student's previous inquiries or academic performance. An empirical study by Johnson et al. (2023) showed that institutions leveraging NLP for personalized student support saw a 20% increase in utilization rates of academic support services, demonstrating its effectiveness in enhancing student engagement.

NLP technologies facilitate the analysis and reporting of administrative data by converting complex data sets into understandable insights. According to Zhang and Zhao (2021), NLP can transform raw data into comprehensive reports that highlight trends, challenges, and opportunities within the institution. This capability enhances transparency and accountability in decision-making processes. Furthermore, an empirical study by Hernandez and Lopez (2024) illustrated that using NLP tools for data analysis improved reporting accuracy by 25%, enabling better strategic planning.

A study by Johnson et al. (2023) explored the implementation of NLP-powered catboats at a large university to improve student support services. The research revealed that the catboats effectively handled 70% of routine inquiries, resulting in a significant reduction in response times and increased student satisfaction. This case underscores the effectiveness of NLP in enhancing administrative operations and supporting student engagement. Brown and Green (2022) examined the use of sentiment analysis through NLP in a mid-sized university. The empirical study found that analyzing student feedback through NLP allowed administrators to identify critical areas for improvement, leading to targeted interventions that increased student satisfaction by 18%. This research highlights the potential of NLP to inform data-driven decision-making in educational management. A study by Smith and Davis (2021) assessed the impact of NLP-driven document processing systems in higher education. The empirical findings indicated that institutions implementing NLP technology reduced document processing times by 40%, leading to faster administrative responses and improved operational efficiency. This case illustrates how NLP can streamline administrative tasks and enhance the effectiveness of educational management.

Finally, automated scheduling systems, powered by AI, have also proven to be invaluable in educational institutions. As argued by Patel and Singh (2020), these systems can optimize timetables, match faculty availability with student needs, and even ensure compliance with

institutional policies. Furthermore, these systems help reduce human error and administrative bottlenecks, thus enhancing overall effectiveness (Patel & Singh, 2020). Automated scheduling systems are becoming essential tools in educational management, significantly enhancing administrative effectiveness by streamlining processes, improving resource allocation, and optimizing time management. These systems leverage technology to automate the scheduling of classes, exams, and other educational activities, thereby reducing manual workloads and minimizing errors. According to Kearney and Thompson (2021), the integration of automated scheduling systems can lead to more efficient operations within educational institutions, allowing staff to focus on more strategic initiatives.

Automated scheduling systems simplify complex administrative tasks, such as class scheduling and room assignments. In the view of Patel and Singh (2020), these systems enable institutions to generate optimal schedules based on various constraints, including faculty availability, student course selections, and room capacity. By automating these processes, institutions can reduce the time and effort required for manual scheduling. An empirical study by Brown and Green (2022) demonstrated that schools using automated scheduling reported a 40% reduction in the time spent on scheduling tasks, allowing staff to allocate their time to other critical areas.

Furthermore, automated scheduling systems improve resource allocation by ensuring that facilities and personnel are utilized efficiently. According to Torres and Garza (2022), these systems can analyze data on room usage, course demand, and faculty availability to create schedules that maximize resource utilization. For example, Kearney and Thompson (2021) found that institutions implementing automated scheduling experienced a 25% increase in classroom utilization rates, reducing idle time and promoting more effective use of facilities. Automated scheduling systems also enhance the student experience by offering personalized scheduling options and reducing scheduling conflicts. In the view of Smith and Davis (2021), these systems can enable students to select courses that fit their schedules, thereby increasing satisfaction and retention rates. Additionally, by minimizing overlaps and conflicts in course offerings, institutions can provide students with a more coherent educational journey. A study by Johnson et al. (2023) revealed that universities employing automated scheduling systems saw a 20% increase in student satisfaction regarding course availability, highlighting the systems' positive impact on the educational experience.

An empirical study by Brown and Green (2022) examined the impact of automated scheduling systems at a large university. The research found that the implementation of an automated

system resulted in a 35% reduction in scheduling conflicts and improved overall operational efficiency. This case highlights the effectiveness of automated scheduling in minimizing administrative burdens and enhancing the educational experience. In another study, Johnson et al. (2023) assessed the effects of automated scheduling on resource utilization in a community college. The findings indicated that the college experienced a 30% increase in classroom occupancy rates and a 15% reduction in the need for additional classroom space. This research underscores the positive implications of automated scheduling for optimizing resource allocation in educational settings.

A study by Smith and Davis (2021) focused on the relationship between automated scheduling and student satisfaction in a mid-sized university. The research revealed that students who benefited from automated scheduling reported a 20% increase in satisfaction with course availability and a 10% increase in retention rates. This empirical evidence illustrates how automated scheduling systems can enhance the student experience and contribute to improved outcomes. According to Garcia and Martinez (2023), future developments may include predictive scheduling, which utilizes historical data to anticipate scheduling needs and preferences, further enhancing administrative effectiveness. Additionally, the integration of automated scheduling systems with other emerging technologies, such as data analytics and cloud computing, can facilitate more agile and responsive educational management processes (Hernandez & Lopez, 2024).

AI technologies such as ML, NLP, automated scheduling, and decision support systems are revolutionizing educational management. As noted by multiple scholars, these tools enhance administrative effectiveness by improving resource allocation, streamlining communication, and providing valuable insights for decision-making. However, the integration of AI into educational management must be done with careful attention to ethical and privacy concerns to ensure long-term success and trust within educational institutions.

Artificial Intelligence (AI) has emerged as a transformative force in various sectors, with education being no exception. In the realm of educational management, AI integration is driving significant enhancements in administrative effectiveness, operational efficiency, and overall institutional performance. According to Lee and Johnson (2019), AI empowers educational institutions to automate routine tasks, optimize resource allocation, and enhance decision-making processes, thereby promoting a more streamlined and effective administrative framework. Similarly, Kearney and Thompson (2021) emphasize that AI-driven tools, such as

predictive analytics and automated scheduling systems, are instrumental in managing complex administrative functions, ranging from student enrollment to staff allocation.

In light of these considerations, this work seeks to explore the various types of AI employed in educational management, examining how they enhance administrative effectiveness while addressing potential challenges. By analyzing recent advancements in AI technology and their applications in education, this study aims to provide insights into how educational institutions can leverage AI to improve their administrative processes and overall operational efficiency. Furthermore, this work will delve into case studies of institutions that have successfully integrated AI into their management systems, highlighting best practices and lessons learned. Through a comprehensive examination of both the benefits and challenges of AI in educational management, this study aspires to contribute to the ongoing discourse on the role of technology in enhancing educational administration and fostering an environment conducive to academic excellence and institutional sustainability.

Theoretically, the Technology Acceptance Model (TAM) which was propounded by Fred Davis in 1989, is a widely recognized framework that can effectively serve as a basis for studying the integration of Artificial Intelligence (AI) in educational management to enhance administrative effectiveness. TAM provides insights into how users come to accept and use new technologies. Below is a discussion of TAM theory, its key components, and its relevance to the context of AI in educational management. TAM posits that perceived usefulness (PU) and perceived ease of use (PEOU) are the primary factors influencing users' decisions to accept and utilize technology (Davis, 1989). According to the model, when users believe that a technology will enhance their job performance (PU) and is easy to use (PEOU), they are more likely to adopt it. Thus, the Technology Acceptance Model (TAM) provides a robust theoretical foundation for studying the integration of AI in educational management. By focusing on perceived usefulness and ease of use, TAM helps explain how educational administrators make decisions regarding technology adoption and can guide institutions in developing strategies to enhance user acceptance. As educational management increasingly relies on AI technologies, leveraging TAM can contribute to more effective administrative practices and improved outcomes in Rivers State-owned Universities.

In the year 2014, the Rivers State University (then Rivers State University of Science and Technology) was ranked the 12th best university in Nigeria due to its integration of ICT into

the administrative as well as academic system. This recognition, is an evidence that digital technologies as well as artificial intelligence has come to stay within the fore wall of Rivers State universities, and must be maintained and improved upon especially in Educational Management Department, in order to ensure the effectiveness of administration. However, recently, there has been a drop in the level of usage of ICT in these universities and hence a below per performance in administrative duties, which could be enhanced with the availability of artificial intelligence. Hence, this study sought to investigate if the use of artificial intelligence in educational management would enhance administrative effectiveness in Rivers State Universities.

Purpose of the Study

The purpose of the study was to examine artificial intelligence in educational management for enhance administrative effectiveness in Rivers State Universities. The objectives sought to:

1. Examine the extent to which machine learning enhance administrative effectiveness in Rivers State Universities.
2. Determine the extent to which natural language processing enhance administrative effectiveness in Rivers State Universities.
3. Ascertain the extent to which automated scheduling systems enhance administrative effectiveness in Rivers State Universities.

Research Questions

The following research question guided the study:

1. To what extent does machine learning enhance administrative effectiveness in Rivers State Universities?
2. To what extent does natural language processing enhance administrative effectiveness in Rivers State Universities?
3. To what extent do automated scheduling systems enhance administrative effectiveness in Rivers State Universities?

Hypotheses

The following null hypotheses were tested at 0.5 level of significance:

H$_{01}$: There is no significant difference between the mean scores of Male and female administrators on the extent machine learning enhance administrative effectiveness in Rivers State Universities.

H_{O2}: There is no significant difference between the mean scores of Male and female administrators on the extent natural language processing enhance administrative effectiveness in Rivers State Universities.

H_{O3}: There is no significant difference between the mean scores of Male and female administrators on the extent automated scheduling systems enhance administrative effectiveness in Rivers State Universities.

Methodology

The design of the study was descriptive survey design. The population of the study was 48 Educational Management administrators from two Rivers State-owned universities (Rivers State University (RSU) and Ignatius Ajuru University of Education, IAUE). The population included the Head of Department, a secretary and the assistant and exams and record officers from the Department of Educational Management of the aforementioned Rivers State Universities. The sample size of the study was 48 respondents which comprised of 19 male and 29 female administrators. The census sampling technique was adopted for the study. The instrument for data collection was a questionnaire titled: Artificial Intelligence in Educational Management for enhanced Administrative Effectiveness in Rivers State Universities Questionnaire (AIEMAERSUQ). The instrument was rated on a 5-point rating scale of Very High Extent, High Extent, Low Extent, Moderate Extent and Very Low Extent. The internal consistency of the instrument was established through Cronbach alpha method. The reliability coefficient showed a of 0.91. The researcher administered the instrument with the help of 2 research assistants, 48were retrieved representing 100% return rate. The research question was answered using mean (X) and standard deviation (SD) statistics, while the hypothesis were tested at 0.05 level of significance using the z-test statistics, A criterion mean of 3.00 was used to determine the decision on the study. The hypotheses were tested using z-test at 0.05 level of significance with a critical value of ±1.96.

Results Presentation

Research Question 1: To what extent does machine learning enhance administrative effectiveness in Rivers State Universities?

Table 1: Mean Responses of Male and female administrators on the Extent Machine Learning Enhance administrative effectiveness in Rivers State Universities

Machine Learning Enhance	Mean

S/N	Items	Male Administrators N=19		Female Administrators N =29		$\bar{x}$set	Rmk
		$\bar{X}$	Std	$\bar{X}$	Std		
1	Machine learning algorithms can analyze historical data to predict student enrollment trends, enabling educational administrators to allocate resources more effectively and ensure optimal class sizes	3.13	0.80	3.28	0.75	3.20	VHE
2	ML models can assess individual student performance and learning styles, allowing educators to tailor instructional strategies and materials, thereby improving student outcomes and administrative efficiency	3.16	0.82	3.14	0.79	3.15	VHE
3	Machine learning can automate administrative tasks such as grading and feedback, reducing the workload on educators and allowing them to focus more on strategic initiatives that enhance the educational experience	3.21	0.69	3.22	0.76	3.23	VHE
4	By analyzing data on resource utilization, ML can help educational institutions optimize their budgets and resource allocation, resulting in significant cost savings and improved operational effectiveness	3.34	0.59	3.18	0.77	3.26	VHE
	Aggregate mean score	**3.20**	**0.73**	**3.22**	**0.76**	**3.21**	

Source: Researcher Field Report, (2024)

The results of table 1 shows that all the items on the table indicate a positive response as they are above (3.00), the cut-off point. It is generally concluded that machine learning enhance

administrative effectiveness in Rivers State Universities with the average mean score of (X= 3.21).

Research Questions 2: To what extent does natural language processing enhance administrative effectiveness in Rivers State Universities?

Table 2: Mean Responses of Male and female administrators on the Extent Natural Language Processing Enhance Administrative Effectiveness in Rivers State Universities

S/N	Natural Language Processing Items	Mean Male Administrators N=19		Female Administrators N =29		$\bar{x}$set	Rmk
		$\overline{\text{X}}$	Std	$\overline{\text{X}}$	Std		
1	Natural language processing tools can facilitate better communication between students, faculty, and administrative staff by automating responses to frequently asked questions and providing instant support through chatbots	3.25	0.76	3.24	0.73	3.24	VHE
2	NLP can analyze feedback and comments from students and staff to gauge sentiment and satisfaction, enabling administrators to address concerns proactively and improve the overall educational environment	3.11	0.71	3.14	0.76	3.12	VHE
3	NLP technologies can streamline the processing and management of academic documents by automatically extracting relevant information and categorizing content, thereby enhancing administrative workflows	3.90	0.67	3.20	0.76	3.07	VHE
4	NLP applications can facilitate communication in multilingual	3.09	0.77	3.18	0.77	3.13	VHE

	educational settings by providing real-time translation services, which can enhance inclusivity and accessibility for non-native speakers					
	Aggregate mean score	**3.34**	**0.73**	**3.19**	**0.76**	**3.14**

Source: Researcher Field Report, (2024)

The results of table 2 shows that all the items on the table indicate a positive response as they are above (3.00), the cut-off point. It is generally concluded that natural language processing enhances administrative effectiveness in Rivers State Universities with the average mean score of (X= 3.14).

Research Question 3: To what extent does automated scheduling systems enhance administrative effectiveness in Rivers State Universities?

Table 3: Mean Responses of Male and female administrators on the Extent Automated Scheduling Systems Enhance Administrative Effectiveness in Rivers State Universities

S/N	Automated Scheduling Systems Items	Mean Male Administrators N=19		Female Administrators N =29		$\bar{x}$set	Rmk
		$\overline{\mathbf{X}}$	**Std**	$\overline{\mathbf{X}}$	**Std**		
1	Automated scheduling systems can optimize the use of classrooms, faculty, and other resources by analyzing various constraints and preferences, ensuring that resources are allocated efficiently	3.25	0.76	3.24	0.73	3.24	VHE
2	These systems can identify and resolve scheduling conflicts in real time, reducing administrative overhead and improving the overall organization of academic activities	3.11	0.71	3.14	0.76	3.12	VHE
3	Automated scheduling tools can provide administrators with valuable	3.90	0.67	3.20	0.76	3.07	VHE

4	insights into utilization patterns and bottlenecks, enabling them to make informed decisions about future scheduling and resource management Automated scheduling systems can accommodate changes in staffing, student enrollment, and course offerings quickly, providing the flexibility needed to adapt to dynamic educational environments	3.09	0.77	3.18	0.77	3.13 VHE
	Aggregate mean score	3.25	0.76	3.25	0.74	3.22

Source: Researcher Field Report, (2024)

The results of table 3 shows that all the items on the table indicate a positive response as they are above (3.00), the cut-off point. It is generally concluded that automated scheduling systems enhance administrative effectiveness in Rivers State Universities with the average mean score of (X= 3.22).

Test of Hypotheses

The following hypotheses were tested at 0.05 level of significance.

H_{O1}: There is no significant difference between the mean scores of Male and female administrators on the extent machine learning enhance administrative effectiveness in Rivers State Universities.

Table 4: t-Test Analysis on the Difference in the mean ratings of Male and female administrators on the Extent Machine Learning Enhance Administrative Effectiveness in Rivers State Universities

Respondents	N	$\overline{X}$	SD	Df	z-calc.	t-crit..	s/level	Decision
Male Administrators	19	3.20	0.73	46	0.28	±1.96	0.05	**Accepted**
Female Administrators	29	3.22	0.76					

Source: Researcher Field Report, (2024)

Table 4 showed the result for the t-Test Analysis on the difference in the mean ratings of Male and female administrators on the extent machine learning enhance administrative effectiveness

in Rivers State Universities. The result showed that the z-calc. value was 0.28, while the t-crit. was ±1.96 at 0.05 level of significance. The result showed that z-calc. was less than t-crit. which means that the null hypothesis was accepted. Thus, the findings indicated that there is no significant difference in the mean ratings of Male and female administrators on the extent machine learning enhance administrative effectiveness in Rivers State Universities.

H$_{O2}$: There is no significant difference between the mean scores of Male and female administrators on the extent natural language processing enhance administrative effectiveness in Rivers State Universities.

Table 5: t-Test Analysis on the Difference in the Mean Ratings of Male and female administrators on the Extent Natural Language Processing Enhance Administrative Effectiveness in Rivers State Universities

Variable	N	$\overline{X}$	SD	Df	z-calc.	t-crit..	s/level	Decision
Male Administrators	19	3.34	0.73	46	0.073	±1.96	0.05	**Accepted**
Female Administrators	29	3.19	0.76					

Source*: Researcher Field Report, (2024)*

Table 5showed the result for the t-Test analysis on the difference in the mean ratings of Male and female administrators on the extent natural language processing enhance administrative effectiveness in Rivers State Universities. The result showed that the z-calc. value was 0.073, while the t-crit. was ±1.96 at 0.05 level of significance. The result showed that z-calc. was less than t-crit. which means that the null hypothesis was accepted. Thus, the findings indicated that there is no significant difference in the mean ratings of Male and female administrators on the extent natural language processing enhance administrative effectiveness in Rivers State Universities.

H$_{O3}$: There is no significant difference between the mean scores of Male and female administrators on the extent automated scheduling systems enhance administrative effectiveness in Rivers State Universities

Table 6: t-Test Analysis on the Difference in the Mean Ratings of Male and female administrators on the Extent Automated Scheduling Systems Enhance Administrative Effectiveness in Rivers State Universities.

Variable	N	$\overline{X}$	SD	Df	z-calc.	t-crit..	s/level	Decision
Male Administrators	19	3.25	0.76	46	0.07	±1.96	0.05	**Accepted**
Female Administrators	29	3.25	0.74					

Source*: Researcher Field Report, (2024)*

Table 6showed the result for the t-Test analysis on the difference in the mean ratings of Male and female administrators on the extent automated scheduling systems enhance administrative effectiveness in Rivers State Universities. The result showed that the z-calc. value was 0.070, while the t-crit. was ±1.96 at 0.05 level of significance. The result showed that z-calc. was less than t-crit. which means that the null hypothesis was accepted. Thus, the findings indicated that there is no significant difference in the mean ratings of Male and female administrators on the extent automated scheduling systems enhance administrative effectiveness in Rivers State Universities**.**

Discussion of findings

The results from the study on "Artificial Intelligence in Educational Management for Enhanced Administrative Effectiveness in Rivers State Universities" revealed the following:

Machine Learning and Administrative Effectiveness: It was found that, to a high extent, machine learning significantly enhances administrative effectiveness in the universities. This suggests that tasks such as data analysis, decision-making, and resource management are better managed with machine learning technologies. According to Patel and Singh (2020), ML-driven decision support systems enable administrators to make informed decisions based on comprehensive data analysis, leading to more effective strategic planning and policy formulation. Furthermore, these systems reduce the reliance on intuition-based decisions, thereby minimizing biases and errors. Additionally, there is no significant difference between the perceptions of male and female administrators regarding the extent of machine learning's impact, indicating a shared understanding across gender lines. Kearney and Thompson (2021) found that ML-driven automation reduced task completion times by up to 40%, enabling faster and more efficient administrative operations. Brown and Green (2022) explored the implementation of ML-driven scheduling systems at Stanford University. Their empirical research demonstrated that the optimized scheduling led to a 20% reduction in scheduling conflicts and a 25% improvement in resource utilization. The study highlights how ML can

streamline administrative processes and enhance the efficiency of resource management in higher education institutions.

Wilson and Clark (2023) examined the impact of ML-powered personalized learning systems at the Massachusetts Institute of Technology (MIT). Their empirical study revealed that personalized learning paths increased student academic performance by 12% and course completion rates by 15%. This research illustrates the potential of ML to enhance educational outcomes by providing tailored learning experiences that meet individual student needs.

Natural Language Processing (NLP) and Administrative Effectiveness: The findings indicate that NLP, to a high extent, enhances administrative effectiveness as well. This points to improvements in tasks such as communication, document processing, and data retrieval. According to Zhang and Zhao (2021), the integration of NLP into educational management systems allows institutions to streamline administrative tasks, improve student support services, and enhance decision-making processes. In the view of Lee and Johnson (2019), NLP technologies can facilitate better communication between students, faculty, and administrative staff. For instance, NLP can analyze communication patterns and identify areas where misunderstandings may occur, allowing institutions to provide targeted training and resources. Similarly, Garcia and Martinez (2023) emphasize that NLP can assist in translating documents and communications into multiple languages, promoting inclusivity in diverse educational environments.

Similar to the findings on machine learning, there is no significant difference between male and female administrators in their perception of NLP's effectiveness. A study by Johnson et al. (2023) supported this result as it found that NLP tools such as the Chabot effectively handled 70% of routine inquiries, resulting in a significant reduction in response times and increased student satisfaction. Similarly, Brown and Green (2022) examined the use of sentiment analysis through NLP in a mid-sized university. The empirical study found that analyzing student feedback through NLP allowed administrators to identify critical areas for improvement, leading to targeted interventions that increased student satisfaction by 18%. This research highlights the potential of NLP to inform data-driven decision-making in educational management. A study by Smith and Davis (2021) assessed the impact of NLP-driven document processing systems in higher education. The empirical findings indicated that institutions implementing NLP technology reduced document processing times by 40%, leading to faster

administrative responses and improved operational efficiency. This case illustrates how NLP can streamline administrative tasks and enhance the effectiveness of educational management.

Automated Scheduling Systems and Administrative Effectiveness: Automated scheduling systems also enhance administrative effectiveness to a high extent. These systems have improved time management, meeting coordination, and resource allocation within the universities. According to Torres and Garza (2022), these systems can analyze data on room usage, course demand, and faculty availability to create schedules that maximize resource utilization. For example, Kearney and Thompson (2021) found that institutions implementing automated scheduling experienced a 25% increase in classroom utilization rates, reducing idle time and promoting more effective use of facilities.

Finally, the result for the corresponding hypothesis 3 on Table 6 above showed that there is no significant gender-based differences were observed in how administrators viewed the impact of automated scheduling systems. In support of the finding, Brown and Green (2022) who examined the impact of automated scheduling systems at a large university. The research found that the implementation of an automated system resulted in a 35% reduction in scheduling conflicts and improved overall operational efficiency. This case highlights the effectiveness of automated scheduling in minimizing administrative burdens and enhancing the educational experience. In another study, Johnson et al. (2023) who assessed the effects of automated scheduling on resource utilization in a community college, indicated that the college experienced a 30% increase in classroom occupancy rates and a 15% reduction in the need for additional classroom space. This research underscores the positive implications of automated scheduling for optimizing resource allocation in educational settings.

Conclusion

The study was carried out to examine artificial intelligence in educational management for enhance administrative effectiveness in Rivers State Universities. The findings suggest that artificial intelligence (AI) tools such as machine learning, natural language processing, and automated scheduling systems have a substantial impact on improving administrative effectiveness in Rivers State Universities. These AI technologies streamline administrative processes, improve decision-making, and enhance resource management, leading to better organizational outcomes. Importantly, both male and female administrators share similar views on the extent of AI's impact, indicating a consensus on its value across genders.

Recommendations

1. **Increased AI Adoption in Administrative Processes**: The universities should further invest in the integration of AI technologies like machine learning, NLP, and automated scheduling systems. This will help in optimizing decision-making, communication, and overall administrative efficiency.

2. **Continuous Training for Administrators**: To fully harness the benefits of AI technologies, it is recommended that regular training programs be conducted for both male and female administrators. These programs should focus on up skilling staff in AI-driven tools and processes to ensure their effective use.

3. **AI Customization for Local Administrative Needs**: The universities should work with AI developers to customize machine learning, NLP, and scheduling systems to meet the specific administrative needs of educational institutions in Rivers State. This will ensure that AI tools are aligned with local administrative goals and challenges, further enhancing effectiveness.

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Educational Waste Audit and Reduction Plans for Sustainable Utilization of Instructional Facilities in Public Secondary Schools in Rivers State

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Abstract

The study examined Educational Waste Audit and Reduction Plans for Sustainable Utilization of Instructional Facilities in Public Secondary Schools in Rivers State. Two research questions and two hypotheses were answered and tested in the study respectively. The design for the study was the analytic descriptive survey. The population comprised all the 268 public senior secondary schools in Rivers State with 268 principals (218 males and 50 females) from which a sample of 215 male and female principals, selected using the purposeful proportionate and stratified random sampling technique. Respondents of the study responded to a 21 – item instrument titled "Educational Waste Audit and Reduction Plans for Sustainable Utilization of Instructional Facilities Scale (EWARPSUIFS), designed by the researchers in the modified 4-point Likert Scale Module of Very High Extent (VHE), High Extent (HE), Low Extent (LE) and Very Low Extent (VLE), with a reliability index of 0.85, obtained using Cronbach Alpha Model. In all, 218 copies of the questionnaire were administered to the respondents in their various schools, 217 (99%) were retrieved, while 215 (99%) survived after coding and were used in the statistical procedures. Mean and Standard deviation were used in answering the research questions while z-test was used in testing the hypotheses at 0.05 level of statistical significance. The results of the study show that educational waste audit and reduction plans enhance the sustainable utilization of instructional facilities in secondary schools in Rivers State to a high extent. The study also established no significant difference between the mean ratings of male and female principals on the extent to which educational waste audit and reduction plans enhance the sustainable utilization of instructional facilities in secondary schools in Rivers State. The study concluded that waste audit and reduction plans are viable strategies for effectively enhancing sustainable utilization of instructional facilities in secondary education. Consequently, it was recommended that school leaders and other stakeholders should continue to conduct educational waste audits and apply good reduction plans in managing school facilities for sustainable utilization.

Introduction

Sustainability is non-discriminatory, it is healthy and meets needs without affecting the future. It takes care of today without compromising tomorrow. It is a necessary tool for success in all facets of endeavour.

Sustainability is necessary in education, economy, social inclinations, politics and even religion. There is economic sustainability if the basic needs and aspirations of the people are adequately taken care of. In politics, the kind of leadership we have should be such that is healthy and all encompassing. Social inclinations should be mutual and symbiotic and not parasitic. Our education should be such that guides the moulding of our students' attitudes, skills and mental development, same goes for religion.

Satander Open Academy (2024), proffers that sustainability consists of fulfilling the needs of the future generations while ensuring a balance between economic growth, environmental care and social well-being. This brings to fore, the importance of sustainability.

The researchers say sustainability is taking care of now and not compromising tomorrow, as a man is wise if his actions are guided by anticipated consequences. If a man's action today endangers the future, his actions are not sustainable. There is therefore, evidential need for the sustainable utilization of instructional facilities which is inevitable if educational needs must be satisfied.

Instructional facilities as defined by Law Insider (2024), means indoor facilities used for private commercial instruction in arts, crafts, physical fitness or other skills; it is the university property that is directly related to the educational mission of the university. Richtmann Publishing (2024), views instructional facilities as facilities that are specifically meant for direct teaching and learning. They include classrooms, classroom seats, laboratories, libraries, experimental equipment, chalkboard, audio-visual learning, equipment, zoological gardens and experimental agricultural farms. University of Bufalo (2024), goes further to give examples of instructional facilities to include classrooms, seminar rooms, instructional laboratories, on-campus clinics, cybaries and other spaces used principally for the purpose of delivering formal instructions to our students. It is however, worth noting that these instructional facilities need to be sustainably utilized.

Sustainable facilities utilization and management go hand-in-hand. Instructional facilities from all indications need to be sustainably utilized through usage and management practices. A step further, incorporating sustainable facility utilization practices in the school system, can be of great benefit. Simply put FMX (2024), offers sustainable management practices that include reducing electricity and water usage, implementing waste management best practices and adopting green cleaning. It is believed that these procedures will keep your building and facilities comfortable, safe and properly functioning. Sustainable utilization of

facilities gives rise to a long-lasting facilities focused on resource and energy efficiency with reduced operational costs.

Some of the benefits proffered by the scholar above for adopting sustainable practices in facilities utilization or management include decrease in the environmental carbon footprint, conducive working environment, cost savings, waste reduction, and enhanced brand reputation.

Waste reduction as a benefit of sustainable practices in facilities utilization, requires waste audit. Educational waste in Nigeria is a narrative as old as education itself. The impact of this waste on our educational system which secondary school is one is a grown concern. The school known for its transmitive and preservative tendencies is a beehive of activities and thus needs to be adequately cared for by stakeholders, for sustainability, to stand the test of time, considering its all-encompassing role.

Damages and loss go hand-in-hand in the process of exploration. The school as an entity, unavoidably, cannot save itself from any damage or loss and as such, needs human resources for its management. This human resource in education system as engraved by ADP (2024), is any person who is compensated for supplying skills or knowledge, to help an organization achieve its business goals. In the school system, Ebong (2006), identifies them as academic and non-academic staff. These human resources are necessary tools for waste audit and reduction plans.

Educational Waste Audit for Sustainable Utilization of Instructional Facilities

Educational waste audit has been identified as an important variable for sustainable utilization of instructional facilities. The opinion of the researchers lies in the fact that education as an instrument of change, should be jealously guarded, to attain return on investment, which will be of benefit to the individuals and the society at large. If education must be held accountable for individual and societal benefit, there is necessary need for educational waste audit.

Educational waste is phenomenal. In the attempt to improve education, methods we know won't work are often employed. With each new government, we employ diverse policies and programmes that often, do not stand the test of time, instead of consolidating on and improving upon policies already in our threshold. This attitude produces the same wasteful results. Waste is dangerous and must be considered as such, with the hunger to crush it, overriding our personal interest and hurry to flaunt new policies to massage our ego, without doing our homework and considering the implications on our educational system.

The Conversation (2024), has defined educational waste as the time and resources that are wasted and could be used more effectively, while trying to educate. UNESCO (2024), defines educational wastage as effects of the associated problems of repetition and dropping out. The scholar believes that whether we are considering education as a social or private investment, allowance must be made for the fact that some students do not complete a course while others repeat parts of the course in order to gain a qualification.

It is worth understanding before we look extensively into educational waste audit that educational waste refers to the inefficient as well as unnecessary use of educational resources, which consists physical and non-physical waste such as unnecessary energy consumption, unused school materials, and redundant administrative tasks and ineffective teaching methods respectively. Educational waste also looks into educational resources and funding. It is different from educational wastage as educational wastage refers to loss or inefficient use of human potential as it looks at students' outcomes and achievement among others. While educational waste considers resources, educational wastage considers human potential.

Educational waste audit is inevitable and has been identified as an important variable for the sustainable utilization of instructional facilities. The researchers define educational waste audit as a plan to address wasted time and resources that could have been more effectively and efficiently utilized in the process of educating. It is the view of the researchers that education should be jealously and zealously guarded as it is an important code to societal fabrics.

Google Search (2024), identified waste audit as allowing teachers and pupils to understand the types and quantities of waste generated within their school and where the waste is generated. Method Recycling (2024), believes that waste audit is a systematic review of all waste that is generated within a workplace. It thus gives an organization a clear idea of what they are throwing out. In another view, Huntington Park (2024), defines waste audit as a formal, structured process used to quantify the amount and types of waste being generated by an organization. The scholars believe that information from audits will help in the identification of current waste practices and how they can be improved. The scholars also believe that being waste wise means a more efficient and effective organization, reduced waste management costs and better use of limited natural resources. Hazimihalis (2023), defines waste audit as a method for analyzing an organizations waste stream.

Educational waste audit with the intent of improving efficiency and enhancing outcomes towards sustainable utilization of instructional facilities, is systematic in its identification,

analysis and quantification of waste in the school system. There are however, different types of educational audit as proffered by some scholars.

Organic Waste Smart School (2004), posits that waste is typically sorted into type of waste and location. The scholars believe that in conducting a simple audit, schools may sort their waste into three distinct waste types which are organics, recyclables and non-recyclables.

As stipulated by Meta Al (2024), there are several types of educational waste audit categorized based on scope, focus and methodology. They include in terms of scope, comprehensive audit, which evaluates the entire institution, departmental audit, which focuses on specific departments, programmatic audit, which examines specific programmes or courses. Focused-based audits has environmental audit that examines energy, water and waste management; financial audit that analyzes financial expenditures and resource allocation, educational audit that evaluates teaching methods, curriculum and students outcomes; operational audit which assesses administrative processes and efficiency. Methodology-based audit from its perspective has quantitative audit which uses numerical data and statistical analysis; qualitative audit that examines non-numerical data such as policies and procedures; mixed-methods audit which combines quantitative and qualitative approaches.

Other specific audits as identified apart from those above are energy audit that evaluates energy consumption and efficiency; water audit examining water usage and conservation; waste audit which analyzes waste generation, reduction and disposal; paper audit that examines paper usage and reduction opportunities. In addition are technology audit that evaluates technology usage, efficiency and waste; curriculum audit that examines curriculum alignment; relevance and effectiveness; facilities audit, evaluating facility condition, maintenance and efficiency; transportation audit that examines transportation operations, usage and efficiency.

Other audits as categorized by the scholar above are internal audit conducted by internal staff; external audit conducted by external experts or organizations; self-assessment audit where institutions evaluate themselves, and third-party audit conducted by independent organizations.

A school waste audit can be identified as a way to ascertain what is being thrown away or wasted. Performing one, can be "a stitch in time that saves nine as institutions identify areas of improvement, waste reduction, for efficiency, effectiveness and sustainable utilization.

Guberman and Fitzgerald (2023), (as cited in Hazimihalis2023), proffered a simple waste audit checklist for any business. They believe that before you can reduce waste that you need data to create the smartest plan of attack. If you don't have the information on-hand, there is need for a waste audit. The process of conducting waste audit they believe should include

assemble a team and set a date; which involves finding a volunteer from each department to form your waste auditing team with at least five people, making the group an ongoing "sustainability committee" that can oversee any changes you want to make and then pick a week for the audit without any special events. The second point is to determine your waste categories by making a list of the most common trash types your business produces such as glass, paper, signage, cardboard, food waste, plastic bottles, general plastic, aluminium cans, display materials and materials packaging. The third point is to gather your tools. This is to stock up on a few supplies, to make sure our team can work safely. The supplies needed could include an open area for sorting the trash, tongs for each volunteer (optional), clipboards for recording your findings, a bathroom scale for weighing each category, labeled boxes for sorting each waste category, face masks and rubber gloves for each volunteer, trash bags for bagging your waste after the audit. Fourthly, sort your trash. This is done by gathering all the trash and recycling from your building; label each trash bag with the department it came from; weigh all the trash to get a baseline for how much you throw out each week; weigh all the recyclables to establish how much you recycle each week; wearing gloves, sort all materials into the boxes for their categories i.e. if you labeled your trash by department, make sure each has separate boxes; as you work, note any recyclables mixed in with the trash, and once everything has been sorted, weigh each category and fifthly, analyze your results. To analyze your results involves to calculate and record your waste diversion rate using this process such as divide the weight of all your waste (trash recyclables) and multiply the result by 100, to give you a weekly waste diversion percentage; look at the weights you recorded for individual waste categories.

Linkedin (2024), offers seven key steps to successful audit to include set goals and objectives such as, are you aiming to reduce the amount of waste your organization produces? Increase recycling rates? and identify areas for improvement. Secondly, gather data. This involves types of waste produced, amount of waste generated, origins of the waste, and disposal methods. The next steps are to analyze the data; develop recommendations; implement the recommendations; monitor and evaluate; and repeat the process.

For the purpose of this study, the researchers are considering the auditing of inefficient and unnecessary use of educational resources, consisting of physical and non-physical waste, detrimental to sustainability in the utilization of educational resources. Some of these wastes include paper, cardboard, plastic bottles, aluminium cans, vandalization of facilities, school utilities, financial resources among others. Nine steps were proposed by the researchers for a successful waste audit to include assemble your team; set goals and objectives, gather data such

as types of waste; origins of waste; amount of waste generated; and disposal method; analyze the data by categorizing and calculating the total amount of waste generated; note your findings i.e. to show the percentage of each waste category. This however, is not a rejection of those proffered by other scholars.

Educational Waste Reduction Plans for Sustainable Utilization of Instructional Facilities

Another important variable identified for sustainable utilization of instructional facilities is educational waste reduction plans. When reduction is mentioned, what readily comes to mind is a decrease in size, amount, length etc. as the case may be.

Educational waste reduction in the view of Encyclopedia (2024), also known as source reduction, is the practice of using less material and energy to minimize waste generation and preserve natural resources. Waste reduction is believed by the scholar to also mean economic savings as fewer materials and less energy is used when waste-reduction practices are applied. CT. Gov (2024), defines educational waste reduction as the systematic efforts made by educational institutions to minimize waste, optimize resources and promote sustainability in all aspects of their operations. The researchers define educational waste reduction plan as the effort to address waste in the use of time and material in the process of educating, for enhanced outcomes

Educational waste reduction plans can promote sustainability and enhance educational outcomes. Miller (2023), believes that planning to reduce the total amount of waste generated by your school is essential to saving money, protecting health and safety of your people and reaching environmental and sustainability targets. The scholar proposed nine steps to developing an effective waste reduction and management plan to include form a waste management team; conduct a waste audit; establish benchmarks and set achievable goals; keep waste hierarchy top of mind; assess your current methods of waste disposal; select the proper waste management partner; create an action plan; train your employees; track your progress. Meta Al (2024), postulates that educational waste reduction plans are strategic documents outlining specific actions and initiatives to minimize waste, optimize resources and promote sustainability in educational institutions with purpose to reduce waste generation, improve operational efficiency, promote environmental sustainability, conserve natural resources and enhance educational outcomes. The scholar further enumerated the key components of waste audit plan to include waste assessment and analysis, goal setting and targets, strategies and initiatives, implementation timeline, monitoring and evaluation, stakeholder engagement and budget allocation. Fragnani and Guimaraes (2024), are of the view that waste management plan

in the campus can provide at least three advantages which are decreasing the generation of waste by minimizing consumption, promoting income generation for people involved in recycling chain and training human resource as multiplier agents of waste management.

In another dimension, waste managed (2024), believes that by implementing effective waste reduction strategies, schools can play a crucial role in promoting sustainability and educating future generations about the importance of looking after the environment. Some of the strategies the scholar suggested for educational waste reduction plans include implement school recycle programmes, reduce food waste, minimize single-use plastics; education on waste awareness; and partnership and programmes.

The strategies and initiative as proposed by the scholar for educational waste audit plans are reduce paper usage, implement recycling programmes, energy-efficient lighting and equipment, water conservation measures, waste reduction challenges, sustainable procurement practices, educational programmes and curriculum integration staff training and engagement, student involvement and empowerment, and community partnerships and outreach.

The Nature Conservancy (2024), suggested eight ways to reduce waste. They include use a reusable bottle/cup for beverages on-the-go. Use reusable grocery bags, and not just groceries. Purchase wisely and recycle; compost it; avoid single use food and drink containers and utensil; buy second handed items and donate used goods; shop local farmers markets and buy in buck to reduce packaging; and curb your use of paper: mail, receipts, and magazines.

The researchers from reviews, made some deductions. Some educational reduction plans were proffered to include reducing the use of paper through digital alternatives; promote sustainable behaviours among students and staff; implementation of recycling programs; conducting regular financial audits; recycle organic waste for agriculture; encourage transparency and accountability; prioritize needs over wants; educate and engage the school community; implementation of energy; efficient practices; regular maintenance of facilities, and partnership and programmes. This is however, not a rejection of those proposed by other scholars above.

Statement of the Problem

Educational waste is a re-occurring decimal in our school system. This is obvious with the heaps we encounter each day, ranging from paper usage, plastic bottles etc. to reckless use of desks, electricity as well as other school facilities, not missing out the non-accountability and transparency in the use of finances, prioritizing wants over needs, at the detriment of the school system. This is prevalent even with the leadership of school administrators, government and

stakeholders who are supposed to address these challenges. However, a close interaction with the teachers and students reveal that instructional facilities are not sustainably utilized in public senior secondary schools.

It is thus, obvious that educational institutions with these challenges may find it difficult to achieve sustainable utilization of instructional facilities. This becomes a source of worry to the researchers.

This study was therefore, contemplated to address these challenges, hence, the need to investigate educational waste audit and reduction plans as viable instruments for the sustainable utilization of instructional facilities in secondary schools.

Aim and Objectives of the Study

This study examined educational waste audit and reduction plans for sustainable utilization of instructional facilities in secondary schools in Rivers State. Specifically, the study sought to;

1. Investigate the extent to which educational waste audit determines sustainable utilization of instructional facilities in secondary schools in Rivers State.

2. Ascertain the extent to which educational waste reduction plans determine sustainable utilization of instructional facilities in secondary schools in Rivers State.

Research Questions

The following research questions were answered to obtain the findings;

1. To what extent does educational waste audit determine sustainable utilization of instructional facilities in secondary schools in Rivers State?

2. To what extent do educational waste reduction plans determine sustainable utilization of instructional facilities in secondary schools in Rivers State?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance in the study;

1. There is no significant difference between the mean ratings of male and female secondary school principals on the extent to which educational waste audit determines sustainable utilization of instructional facilities in secondary schools in Rivers State;

2. There is no significant difference between the mean ratings of male and female secondary school principals on the extent to which educational waste reduction plans determine sustainable utilization of instructional facilities in secondary schools in Rivers State.

Methodology

The design for the study was the analytic descriptive survey because results were tested and described the way they occurred. The population of the study comprised all 268 public senior secondary schools in Rivers State (Planning Research and Statistical Department, RSSSSB, Port-Harcourt, Rivers State 2020), from which a sample of 215 principals (165 males, 50 females were selected using the proportionate stratified random sampling technique. Respondents of the study responded to a 21-item instrument titled "Educational Waste Audit and Reduction Plans for Sustainable Utilization of Instructional Facilities Scale (EWARPSUIFS), designed by the researchers, in the modified 4-point Likert Scale Module of Very High Extent (VHE), High Extent (HE), Low Extent (LE) and Very Low Extent (VLE), with a reliability index of 0.85, which was considered reliable and obtained using Cronbach Alpha. In all, 218 copies of the instrument were administered to the respondents at their various schools. 217 (99%) were retrieved while 215(99%) survived after coding and were used in the statistical procedures. Mean and Standard deviation were used in answering the research questions while z-test was used in testing the hypotheses at 0.05 level of statistical significance.

Results

The results of the study were obtained from the answers to research questions and results to the test of hypotheses as presented in the proceeding section.

Research Question 1: To what extent does educational waste audit determine sustainable utilization of instructional facilities in secondary schools in Rivers State?

Table 1: Mean and Standard Deviation on the Responses of Male and Female Secondary School Principals on the Extent to which Educational Waste Audit Determines Sustainable Utilization of Instructional Facilities in Secondary Schools in Rivers State

S/N	Items	Male		Female		Wx	Remark
		$\bar{X}_1$	SD$_1$	$\bar{X}_2$	SD$_2$		
1.	To commence successful waste audit, the principal needs to assemble a credible team to achieve sustainability	3.79	0.98	3.40	0.92	3.60	VHE
2	In carrying out educational audit, the goal and objectives of the exercise need to be defined towards sustainability.	3.32	0.92	3.20	0.90	3.26	VHE
3.	Specifying the types of waste or the audit process aids its identification for sustainability in utilization of school facilities.	3.33	0.91	3.08	0.88	3.21	VHE
4.	Determining the origin of waste addresses it for sustainability in facilities utilization.	3.12	0.89	3.00	0.87	3.06	VHE

5.	The amount of waste generated could be controlled by educational audit to attain sustainability in facilities utilization.	3.54	0.94	3.34	0.92	3.44	VHE
6.	The disposal method employed, as identified by the audit process could be improved for sustainability in school facilities utilization.	2.89	0.85	3.14	0.89	3.02	VHE
7.	Data analysis in educational audit is a necessary step towards achieving sustainability.	2.80	0.84	2.78	0.84	2.79	HE
8.	Categorization of data during audit gives a clearer picture of wastes, towards sustainable utilization.	2.96	0.86	2.86	0.85	2.91	HE
9.	Knowing the total amount of waste generated in the system is necessary to address waste for sustainability.	3.25	0.90	3.10	0.88	3.18	VHE
10.	Audit findings should be noted to show the percentage of waste category for sustainable utilization.	3.02	0.87	3.20	0.90	3.11	VHE
Grand Mean 3.16		**3.20**	**0.90**	**3.11**	**0.89**	**3.16**	**VHE**

Data on table 1 show that item 1, 2, 3, 4, 5, 6, 9, and 10 had weighted mean between 3.00 and 4.00 and therefore fell under Very High Extent (VHE). Differently, items 7 and 8 had weighted mean scores between 2.00 and 3.00 which fell under High Extent (HE). In summary, with a grand mean score of 3.16 (VHE), male and female secondary school principals agreed that to a very high extent, educational audit plans determine the sustainable utilization of instructional facilities in secondary schools in Rivers State.

Research Question 2: To what extent do educational waste reduction plans determine sustainable utilization of instructional facilities in secondary schools in Rivers State?

Table 2: Mean and Standard Deviation on the Responses of Male and Female Secondary School Principals on the Extent to which Educational Waste Reduction Plans Determine Sustainable Utilization of Instructional Facilities in Secondary Schools in Rivers State

S/N	Items	Male		Female		$W\bar{x}$	Remark
		$\bar{X}_1$	SD$_1$	$\bar{X}_2$	SD$_2$		
11.	Reducing the use of paper through digital alternatives aids educational waste reduction for sustainable utilization of instructional facilities.	3.59	0.95	3.70	0.96	3.65	VHE
12	Promoting sustainable behaviours' among students and staff helps to achieve waste reduction for sustainable utilization of instructional facilities.	3.63	0.96	3.65	0.96	3.64	VHE

13.	The implementation of recycling programmes reduce waste for sustainability in the utilization of instructional facilities.	3.63	0.96	3.64	0.96	3.64	VHE
14.	Regular financial audits should be conducted to reduce waste for sustainability in facilities utilization.	2.98	0.87	2.96	0.86	2.97	HE
15.	Organic waste should be recycled for agriculture, to reduce waste for sustainable utilization of instructional facilities.	3.20	0.90	2.96	0.86	3.08	VHE
16.	Educational waste reduction plan should encourage transparency and accountability for sustainability in facilities utilization.	3.68	0.96	3.74	0.97	3.71	VHE
17.	Educational waste reduction plans should prioritize needs over wants for sustainable utilization of instructional facilities.	3.12	0.89	3.33	0.92	3.23	VHE
18.	The school community should be educated and engaged in the waste reduction plan.	3.61	0.93	3.37	0.92	3.49	VHE
19.	Energy efficiency practices should be implemented in the waste reduction plan.	3.33	0.92	3.45	0.93	3.39	VHE
20.	Regular maintenance of instructional facilities should be carried out to reduce waste.	3.62	0.95	3.68	0.96	3.65	VHE
21.	Programmes and partnerships should be carried out to reduce waste for sustainable utilization of facilities.	3.25	0.90	2.91	0.86	3.08	VHE
	Grand Mean 3.42	**3.42**	**0.93**	**3.40**	**0.92**	**3.41**	**VHE**

Data on table 2 show that items 11, 12, 13, 15, 16, 17, 18, 19, 20 and 21 had weighted mean between 3.00 and 4.00 and therefore, fell under Very High Extent (VHE). Differently, item 14 had weighted mean score between 2.00 and 3.00 which a grand mean score of 3.42 (VHE), male and female secondary school principals agreed that to a very high extent, educational waste reduction plans determine the sustainable utilization of instructional facilities in secondary schools in Rivers State.

Ho1: There is no significant difference between the mean ratings of male and female secondary school principals on the extent to which educational waste audit determines sustainable utilization of instructional facilities in secondary schools in Rivers State.

Table 3: Summary of z-test Analysis of Difference between the Mean Ratings of Male and Female Secondary School Principals on the Extent to which Educational Audit Determine Sustainable Utilization of Instructional Facilities in Secondary Schools in Rivers State.

Subject	N	$\bar{x}$	SD	df	z-cal	z-crit	Results
Male principals	165	3.20	0.90				Not significant
Female principals	50	3.11	0.89	213	0.60	1.96	(Failed to reject)

Data on table 3 show summary of gender, scores, means, standard deviation and z-test of difference between the mean ratings of male and female secondary school principals on the extent to which educational waste audit determines sustainable utilization of instructional facilities in secondary schools in Rivers State. The z-test value calculated and used in testing the hypothesis stood at 0.60, while the z-critical value stood at 1.96, using 213 degrees of freedom at 0.05 level of significance.

At 0.05 level of significance and 213 degrees of freedom, the calculated z-value at 0.60 is less than the critical value of 1.96. Hence, there is no significant difference between the respondents. Consequently, the researchers failed to reject the hypothesis and confirm that there is no significant difference between the mean ratings of male and female secondary school principals on the extent to which educational waste audit determines the sustainable utilization of instructional facilities in secondary schools in Rivers State.

Ho2: There is no significant difference between the mean ratings of male and female secondary school principals, on the extent to which educational waste reduction plans determine sustainable utilization of instructional facilities in secondary schools in Rivers State.

Table 4: Summary of z-test Analysis of Difference between the Mean Ratings of Male and Female Secondary School Principals on the Extent to which Educational Waste Reduction Plans Determine the Sustainable Utilization of Instructional Facilities in Secondary Schools in Rivers State.

Subject	N	$\bar{x}$	SD	df	z-cal	z-crit	Results
Male principals	165	3.42	0.93				Not significant
Female principals	50	3.41	0.92	213	0.13	1.96	(Failed to reject)

Data on table 4 show summary of gender scores, means, standard deviations and z-test of difference between the mean ratings of male and female secondary school principals on the extent to which educational waste reduction plans determines sustainable utilization of instructional facilities in secondary schools in Rivers State. The z-test value calculated and used in testing the hypothesis stood at 0.13 while the z-critical value stood at 1.96, using 213 degrees of freedom at 0.05 level of significance.

At 0.05 level of significance and 213 degrees of freedom, the calculated z-value of 0.13 is less than the critical value of 1.96. Hence, there is no significant difference between the

respondents. Consequently, the researchers failed to reject the hypothesis and confirm that there is no significant difference between the mean ratings of male and female secondary school principals on the extent to which educational waste reduction plans determine the sustainable utilization of instructional facilities in secondary schools in Rivers State.

Discussion of Findings

The first finding of the study is that principals responded that to a Very High Extent (VHE), educational waste audit determines the sustainable utilization of instructional facilities in secondary schools in Rivers State.

The first finding agrees with Hazimihalis (2023), Guberman and Fitzgerald (2023), as cited in Hazimihalis (2023), among others, who in their scholarly papers and research, worked on educational audit towards sustainable utilization of instructional facilities in secondary schools. Corresponding hypothesis resulted in no significant difference between the mean ratings of male and female secondary school principals on the extent to which educational waste audit determines sustainable utilization of instructional facilities in secondary schools in Rivers State. This shows that educational waste audit is a necessary determinant for sustainable utilization of instructional facilities.

The second finding of the study is that principals to a Very High Extent (VHE) responded that educational waste reduction plans determine sustainable utilization of instructional facilities in secondary schools in Rivers State.

The second finding agrees with Miller (2023), Fragnani and Guimaraes (2024), among others, who in their scholarly papers and research, worked on educational reduction plans towards sustainability in the utilization of instructional facilities in schools. Corresponding hypothesis resulted in no significant difference between the mean ratings of male and female secondary school principals on the extent to which educational waste reduction plans determine the sustainable utilization of instructional facilities in secondary schools in Rivers State.

Conclusion

Based on the findings of the study, it is concluded that educational waste audit and reduction plans to a Very High Extent (VHE), determine sustainable utilization of instructional facilities in secondary schools in Rivers State.

Recommendations

In light of the findings of the study, the discussions on them and the accompanying implications, the following are recommended for implementation:

1.   Educational waste audit should be carried out in schools, to check waste and avert its occurrence for sustainable utilization of instructional facilities;

2.   Educational waste reduction plans should be effectively put in place for sustainability in the utilization of instructional facilities.

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Methods of Checking Staff Attendance at Work in Managing Universities in Rivers State, Nigeria and Greater Accra Region, Ghana

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Abstract

The study examines methods of checking staff attendance at work in managing universities in Rivers State, Nigeria and Greater Accra Region, Ghana. The study adopted descriptive research design. The population comprised forty-two (42) principal officers. The sample for the study was the three universities in Greater Accra Region, Ghana. 100% of the principal officers made up the sample size of 42 principal officers. The instrument for the study was a self-constructed questionnaire titled "Method of Checking Staff Attendance in University Management questionnaire (MCSAUMQ). The instrument was validated by 3 experts. Cronbach Alpha method was used to establish the reliability coefficient of 0.86 showing that the instrument was reliable for the study. Mean and percentage rank was used to answer the 1 research question while z-test was used to test the null hypothesis at 0.05 alpha level of significance. The study revealed that checking staff attendance at work is a system for recording and reporting early or late arrival of staff and ghost names thus, recommended that university administrations and policy formulators in the sector should provide biometric registration at all sectors to promote effective method of checking workers attendance to work.

Keywords: Attendance, Biometric Time, Paper and Pen, Identification Card, Closed Circuit Camera.

Introduction

Attendance is the act of being present or participating in a particular event, class, meeting, or activity. It is a record or measurement of individuals who are present at a specific location or event during a given period of time. Attendance is commonly used in educational settings to track students' presence in classes, lectures, or other academic activities. It is also relevant in the workplace to monitor employees' presence during working hours. In the workplace, attendance records may be used for various purposes, including payroll, performance evaluations, and compliance with company policies. Attendance is also a fundamental aspect of monitoring and managing participation in various contexts to ensure accountability and track individuals' involvement in specific activities.

Attendance is as simply showing up for work (Cambridge Business English Dictionary). Staff attendance is however, when employees are to show up for work. This is especially important

for non-exempt employees who frequently perform jobs that require a person to be there to serve customers. Over the years, taking and checking staff attendance at work has been in existence. In this millennium, checking staff attendance had been advanced and employers have developed several methods of checking staff attendance records so as to eradicate 'ghost' names from their payrolls (Nguyen, and Chew, 2019). The initial-level task of any attendance tracking and management system is to get a number of the participants entering and leaving the premises, so to get accurate real-time data on the number of attendees.

In Universities as a community, workers take it for granted of reporting to work at will. For effective job performance in universities, workers need to report to work and perform the required assignments. The universities also have some methods which they use to check-mate the workers to have staff physically present at work like the attendance register. It is important to note that universities have reached a level where proper attendance register needs to be kept. Every staff of the university needs to record time-in and time-out but not in proxy. A modern technology may be used to manage this system in the university to curtail time stealing in attendance register.

There is a multitude of possible automatic or semi-automatic techniques suitable for the task, such as various contact and non-contact optical and laser scanning (for a barcode tag, finger print, photo ID document, etc.), contact-type reading/writing (for one-wire semiconductor iButtons, magnetic strips, chip cards, etc.), infrared sensing, image processing and recognition, proximity tags/cards reading and Radio Frequency Identification (RFID), and so on. Each of them has got its own advantages and drawbacks (Khan, Masrek & Nactzar, 2021).

Time and attendance system is simple and useful way of recording the hours worked by employees as well as providing 'who is' and 'who is not' on site; hence the clock-in system. This clock system has been proven over time to be a game changer in whole educational process (Ugada, 2023). This clock-in system has a wide range of tracking workers from clock cards, swipe badges to biometric finger hand scanner. These advanced clock-in machines identify a person scanning the unique size of the hand, providing 100% effective clock-in solution. This completely eliminates the close friends' problem of colleagues clocking-in for one another.

Biometric time clocks are features of more advanced time attendance system. Using a key, code or chip can generate fraud in the system. Biometric recording attempts to cut-down on fraud such as close friends' clock-in. this helps prevent other types of fraud such as ghost-employees

where employees are not actually at work. This sophisticated system helps to monitor and analyze useful data recording staff working hours. This will help universities in the long run increase productivity as used in Nigeria and Ghana and reduce cost, other methods of checking staff attendance such as pen and paper recording, use of chip, code and swipe card can be faked or forged in any way which may render the system not to be watertight.

Laser scanning (fingerprint, barcode, ID document, etc.). The relevant technologies and systems have been well developed and widely employed, primarily in the access control, security, goods and asset tracking, sale checkpoint, etc. systems. Lately they also found their way into the conference tracking applications, (Wegleiter, 2021). The scanning tools are normally well integrated with the relevant application software run upon both mobile and desktop computer systems and devices. The relatively negative feature of the scanning based systems is the partially intruding character of the attendance registration: the delegates need to physically scan their identifiers every time they pass the entrance scanner (whether a hand-held or stationary type). In large events this could create queuing and "bottlenecks". The above drawbacks are also true with regard to the contact-type tags, key fobs, cards, etc., for example, iButtons (Yang, and Yan, 2021) or simple magnetic and chip cards.

Biometric attendance record is the quickest and easiest to overcome attendance tracking problems, because it cannot be forged or faked. The system is as beneficial as it is; user friendly, easy to use, fast recording automatically, saves a lot of time to record detail accurately, better security, prevents time theft and saves money for the institutions. Another method of checking staff attendance is the use of paper and pen.

Paper and Pen Method of Staff attendance registration in any organization is important to ensure the continued operation. Paper and pen attendance system is use to record the present of staff to work. For any organizations, that record their attendance with large number of staff, there will be a problem as one staff can help the other staff to sign his/her attendance even though they do not go to work or either the staff is late to work. Makhura (2019) states that absence of record administration will in a way influence the conduct of the workers. It is therefore imperative for every staff to register his/her name in any record book provided by the organization. The organization has her obligation to check daily, weekly or monthly on every staff as to be abreast with time. Notwithstanding, however, pen and paper recording of attendance has its own challenges. For example, it wastes a lot of time when every staff should

wait turn by turn just to record his/her present at work not having in mind the number of hours to work per day (Nguyen & Chew, 2019).

Also, at the time natural disaster such as rain, fire may strike, all documents in the office may be destroyed, causing loss of records. There is also likelihood that the leaflet of those records may be torn away or damaged on any obvious reason either by staff or anyone. In addition, the organization may employ timekeeper to supervise the recording to avoid time-stealing by staff which is additional cost. Staff handwriting and legibility can be a setback when compiling record at the end of the week or month. This may lead to a mistake from the compiler. There may be large volume of papers to work with when using pen paper registration.

Jam, et, al., (2018) clarify that:

> *The objective art automated time and attendance system is to keep track of working hours for employee pay and computation and payroll processing, avoid unauthorized overtime enforce company policies (for example; store open and closes time) and so forth. (P. 494).*

Identification (ID) Cards / Swipe Cards

Identification cards (ID) have become an essential component of facility and workplace safety. It is nearly impossible to walk into a workplace without one. Some organizations therefore used the ID card or swipe card concurrently with a clock-in / out to register the attendance of employees in the work place. This helps to remove pen and paper attendance checking to put fraud in time stealing at a very minimal level. Time and attendance are essential in any organization if that would make that organization to meet her targets.

Olayini (2018) and Akomolafe (2019) however contend that in strict sense, there is nothing to oversee in time in light of the fact that the hands of clock keep on moving outside our ability to control yet that an individual ought to choose what to do with time and how best to arrange his exercises inside time allotment. All these convey to the way the time, itself can't be changed, yet its administration require a few strategies, administrative abilities and practices with a specific and goal to accomplish foreordained authoritative and individual targets. Time administration in its current idea alludes to self-control, asset administration arranging setting objectives, appointment, and responsibility of invested energy, planning, sorting out and adjusting needs (Muhammandu, *et. al.,* 2021).

Biometric Method

In biometrics, especially in information technology encompasses methods to analyze physical and behavioural identities to extract unique features for identification or monitoring purposes. Biometric methods involve the use of unique physical or behavioral characteristics to identify and verify individuals. These methods rely on the distinctiveness of certain traits to accurately authenticate a person's identity. Various physical features including faces, eyes, fingers, hand, veins, ears and teeth can be used by this technology. Biometric offers a secure method of access of sensitive services and obviates the need to carry out a token, card, or remember several passwords. The techniques also reduce the risk of lost, forgotten or copied passwords, stolen tokens of over the shoulder attacks. Most people nowadays recognize fingerprint which is widely used today in places such as air ports and the legal system, and it is built into devices such as laptops, phones. (Lim et. al., 2021).

Newman (2021) identifies biometrics as authentic and has three main advantages as low cost of deployment (cost effective), simply to implement and user must be physically available at the point of identification or verification. In any fingerprint image, there are dark lines which are called ridges, whereas the spaces in between those dark lines are called valleys. Ridges and valleys often run in parallel but there are two things that happen to any print. It is either, the ridges and the valleys terminate or they bifurcate. Termination of a fingerprint is simply the situation in which a particular ridge ends abruptly while bifurcation is the situation by which the line splits into two. In the analysis of the fingerprint images during matching (authentication), the pattern of the fingerprint exhibits one or more regions where the ridge lines assume distinctive shapes; which are: loop, delta and whorl. If the fingerprint scan matches any one stored in the database at the enrolment phase, the staff with the fingerprint will be updated as present for the lecture.

Fingerprint register perceived as introduction of security as well as trust for organizations, governments and individuals. Obviously, individual from many cultures are suspicious of being monitored by "officials organizations' using finger print monitoring could be considered as invasion of privacy and some misconceptions exist in the general populate concerning hygiene or transfer of diseases using fingerprint devices. (Newman, 2021). Notwithstanding the above assertion, however, Cavoukian, (2018), Boatwright and Luo (2019), Newman (2021) state that fingerprint eliminates many, if not all, of the risks and major benefits of the system such as:

fingerprint features cannot be forgotten, stolen or lost, it is hard to forge or share and can be combined with token or other identification cards.

(Wang and Yongxu, 2018) posit that fingerprint recognition system scalable for adoption by different sizes of organizations from small companies to national government, so this should not be a problem. Bhargave (2021), Klokova (2021), Kothavale, (2019) and Zhang, (2019) stated that fingerprint recognition method with all its benefits would be ideally suited for adoption by universities to employ identification among large number of students within the school. Closed circuit camera can as well be used in the school.

Closed circuit camera otherwise known as closed circuit television (CCTV) refers to a visible video system intended only for a limited number of viewers. Closed-Circuit Camera, commonly known as a CCTV (Closed-Circuit Television) camera, is a surveillance system that uses video cameras to transmit signals to a specific set of monitors or video recorders in a confined space. Unlike broadcast television, where signals are openly transmitted, CCTV systems are "closed-circuit," meaning the video feeds are only available to a limited set of monitors or recording devices within a private network. Closed-circuit camera system include: Cameras which are the devices that capture video footage. CCTV cameras come in various types, including analogue, digital, and IP cameras. They can be fixed or have pan-tilt-zoom capabilities, and they may be designed for indoor or outdoor use. Monitors relay the video signals from the cameras which are displayed on monitors in real-time. These monitors are typically located in a central control room or security station where operators can observe the footage.

Video Recorders involve CCTV systems often include recording devices, such as DVRs (Digital Video Recorders) or NVRs (Network Video Recorders). These devices store video footage for later review or analysis. Modern systems may use digital storage media, such as hard drives or network-attached. This camera, some organization do not only use it for security, crime prevention, traffic monitoring purposes only but also for checking staff attendance at workplace. Nowadays, complete surveillance is not possible through human eyes, so therefore CCTV video security system is necessary for all business types irrespective of whether it is a small business or multinational companies in which the universities are one part of them. The use of CCTV provides unbiased method of performance evaluation and prevents the interference of a manager's feelings in an employee's review (Mishra and Crampto, 2018).

Statement of Problem

Many staff in universities do not register their time-in and time-out in the attendance register. Some register in proxy which may lead to 'ghost' names on paying vouchers of many universities. The universities spend so much money providing registers in all departments but the purpose have been defeated. That is to say, staff of universities comes to work at will, leave work anytime and sometime absent from work for some days. This is thereby reducing productivity in the institutions and projecting high cost of spending in the universities. It is against these backdrops, the researchers considered some methods of checking staff attendance at work in universities in Rivers State, Nigeria and Greater Accra Region, Ghana. This will help the institutions to use the best method in checking attendance among universities staff to maximize productivity.

Research Objective

The following research objectives guided this study:

Identify the methods of checking staff attendance in university and determine the efficient methods of reducing cost and increase productivity in universities in Rivers State, Nigeria and Greater Accra Region, Ghana.

Research Question

What are the methods of checking staff attendance at work in university management in Rivers State, Nigeria and Greater Accra Region, Ghana?

Hypothesis

There is no significance mean difference between principal officers in Universities in Rivers State, Nigeria and Universities in Greater Accra Region, Ghana on method of checking of attendance at work.

Methodology

The design for the study was descriptive survey design. The population of the study comprised all the three universities in Rivers State, Nigeria (Rivers State University, University of Port Harcourt and Ignatius Ajuru University of Education) and three Universities in Greater Accra Region, Ghana, (University of Ghana, Region; Central University College, Prampram and Valley View University, Oyibi). In the Universities in Rivers State, Nigeria, there are twenty-one (21) principal officers and twenty-one (21) principal officers in Universities in Greater Accra Region, Ghana. The population therefore comprised forty-two (42) principal officers

who constituted the respondent for the study. The sample for study was the three universities in Rivers State, Nigeria and three Universities in Greater Accra Region, Ghana. Census sampling technique was used as such formed the sample size of this study. All the forty – two principal officers were taken representing 100% of the population. The researcher used questionnaire to generate information without manipulating the variables. The instruments for data collection were questionnaire titled: Method of Checking Staff Attendance in University Management Questionnaire (MCSAUMQ).

The questionnaire contains items on the variables. The research questions were patterned after the four-point modified Likert scale of Strongly Agree (SA), Agree (A) Disagree (D) and Strongly Disagree (SD) with values 4, 3, 2 and 1 respectively. The questionnaire was subjected to scrutiny by experts. The Cronbach alpha method was used to establish the reliability coefficient of the instrument which gave a reliability index of 0.86. The instruments were administered and retrieved by the researcher. The research questions were answered using mean and Standard Deviation While z-test was used to test the hypothesis at 0.05 level of significance.

Results and Finding

Research Question 1:

What are the methods of checking staff attendance at work in university management in Rivers State, Nigeria and Greater Accra Region, Ghana?

Table 1: Weighted mean and rank order statistics on the methods of checking staff attendance at work in universities in Rivers State, Nigeria and Greater Accra Region, Ghana.

S/N	Methods of Checking Staff Attendance	Mean for Principal Officers in Rivers State, Nigeria.	Rank	Mean for Principal Officers in Greater Accra Region, Ghana	Rank
1	Pen and Paper Registration	1.67	3rd	1.48	4th
2	By Clock-in and Clock-out	1.62	4th	3.81	3rd
3	By Biometric Method	1.71	1st	3.86	1st
4	By Closed – Circuit Camera	1.71	1st	3.84	2nd
	Aggregate Mena ($\bar{x}$)	6.71		12.63	
	Aggregate SD	1.68		3.16	

Table 1: Showed that items with serial number 1, 2, 3, and 4 have their various mean values below the criterion mean value of 2.50 for the principal officers in Rivers State, Nigeria. This is to say, they all disagree the methods of checking staff attendance at work. Meanwhile, biometric method and closed-circuit camera method ranked 1st with mean score of 1.71.

Paper and pen method of registering attendance ranked 3rd with mean score of 1.67 and clock-in or clock-out card ranked 4th with means score of 1.62 the principal officers in Rivers State, disagreed the methods of checking staff attendance at work, biometric and closed-circuit camera methods remained the effective methods of checking staff attendance in universities in Rivers State from the analysis.

Principal Officers in Greater Accra Region, Ghana have agreed to clock-in or clock-out card method, biometric method and closed-circuit camera method as their various mean values are above the criterion mean value of 2.50. Regrettably they disagreed with paper and pen registering method as the mean value of 1.48 is below the criterion mean value of 2.50.

The analysis can further be agreed by rating from the highest to the lowest mean scores. Biometric method to check attendance ranked 1st with a mean score of 3.86, the table revealed that using closed-circuit method ranked 2nd with mean score 3.84. Clock-in or clock-out method ranked 3rd with mean score of 3.81 and paper and pen register method ranked 4th with a mean score of 1.48.

Test of Hypothesis

Table 2: z-test calculation of the mean difference between principal officers in the universities in Rivers State, Nigeria and University in Greater Accra Region, Ghana on methods of checking staff attendance at work in managing universities.

Categories	N	$\bar{X}$	SD	df	z-cal.	z-crit.	Remark
Principal Officers in Rivers State Universities, Nigeria.	21	1.68	0.96				
				40	5.92	1.96	Rejected
Principal Officers in Greater Accra Region Universities, Ghana	21	3.16	0.61				

Table 2: Revealed that principal officers in the Universities in Rivers State, Nigeria have mean and standard deviation scores of 1.68 and 0.96 respectively while principal officers in Universities in Greater Accra Region, Ghana have mean and standard deviation scores of 3.16 and 0.61 respectively. With a degree of freedom, 40 at an alpha level of 0.05, the calculated z-value of 5.92 is greater than the z-critical value of 1.96. By implication, the null hypothesis is rejected. Therefore, there is a significant difference in the means ratings of principal officers on methods of checking staff attendance at work in managing universities in Rivers State, Nigeria and Greater Accra Region, Ghana.

Discussions

Time management is component in managing universities by administrators. The study identified four methods to check staff attendance at work. This includes; paper and pen register, clock-in or clock-out cards, biometric and closed-circuit camera methods. The study revealed that checking staff attendance at work is a system for recording and reporting late or early arrival of staff to work, absenteeism and eradicating 'ghost' names from universities' payrolls. It is cleared, that biometric method is efficient and time saving method of recording staff attendances. This study is in agreement with the study of Newman (2021) but disagree to the study of Cavoukian (2018) but this is not surprising to the researchers as principal officers in Rivers State Nigeria, Greater Accra Region Ghana agreed to the effective method of checking staff attendance at work using biometric.

The high technologies used to develop this system will provide users with rapid access to any information regarding to staff attendances. Paper and pen register may cost the organization as it has greater disadvantages over other methods mentioned in this study. The method stands at time-stealing and registering in proxy. Clock-in or clock-out method is a little advanced but has its setback. Here the cards can be given out while the staff is not at work. This is in agreement with Olaniyi (2018) as proven of the usefulness of clock-in or clock-out method eliminating pen and paper attendance check.

Ami-Narh, *et. al.,* (2021) studied the adoption of biometric fingerprint timekeeping technology in Ghanaian business community on effectiveness and impact. The study revealed that biometric timekeeping technologies are more secured than traditional timekeeping methods. It is also stated that investing in biometric timekeeping technologies is worth the cost and biometric hardware technologies are not susceptible to frequent breakdown as compared to traditional methods.

Conclusion

Methods of checking staff attendance is paramount to the university managements in order to reduce waste when new technologies are used. Pen and paper are becoming outdated. The new technologies will inject new blood into the system to boost productivities and stamp out 'ghost' names from the paying vouchers. The findings reveal that biometric methods and closed-circuit cameras ranked highest in both regions, indicating their effectiveness in tracking staff attendance. Pen and paper registration and clock-in or clock-out cards receive lower mean scores, suggesting their inadequacies. A z-test analysis indicates a significant difference in the mean ratings of principal officers between universities in Rivers State, Nigeria, and Greater Accra Region, Ghana. This implies variations in the perception and adoption of attendance tracking methods. Paper and pen methods are deemed outdated, and the adoption of new technologies is recommended to boost productivity and eliminate time-stealing practices. The study advocates for the widespread adoption of biometric registration in universities to enhance accuracy, eradicate time-stealing, reduce record loss, and eliminate ghost names from payrolls. As such, universities should phase out the use of paper and pen registration and focus on more advanced and reliable technologies as this will streamline attendance management processes, enhance efficiency and contribute to a more productive and accountable work environment.

Recommendations

Based on the findings of this study, the researchers recommend that:

University administrators and policy formulators in the sector should endeavour to provide biometric registration at all sectors to promote effective method of checking workers attendance to work. This will help eradicate time-stealing, record loss, "ghost" names on payrolls and impersonation in the universities. Universities in both regions should consider the widespread adoption of these technologies to enhance accuracy and efficiency in attendance management.

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Inclusive Education and Digital Literacy: Developing Essential Skills in the Digital Age in Selected Public Secondary Schools in Bayelsa State.

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Abstract

The necessity of incorporating inclusive educational practices alongside digital literacy initiatives to foster a more equitable and skilled society is crucial, as both ensure that all learners, regardless of their backgrounds and abilities, have access to quality education tailored to their needs and are equipped with the competencies required to navigate and thrive in a technology-driven world. This paper considers the concepts of inclusive education, the impact of inclusive education, digital literacy in the digital age, the impact of digital literacy, the integration of inclusive education and digital literacy, and the digital literacy skills needed for inclusive education. While inclusive education policies are widely adopted, there is a significant gap in the practical implementation of these policies, particularly in developing regions where infrastructure and teacher preparedness are limited. Similarly, digital literacy is essential not only for technical proficiency but also for fostering critical thinking, collaboration, and responsible digital engagement. However, the digital divide continues to pose challenges, with marginalized and under-resourced students facing barriers to accessing digital literacy tools and training. This shows that the integration of inclusive education and digital literacy is vital for equipping students with the necessary skills to succeed in the digital era. It was recommended that institutions and administrators incorporate digital literacy skills across subjects and grade levels to ensure that all students develop these competencies.

Keywords: Inclusive Education, Digital Literacy, Skills, Digital Age

Introduction

In the modern educational landscape, the concepts of inclusive education and digital literacy are becoming increasingly critical as society navigates the challenges and opportunities presented by the digital age. Inclusive education is considered an approach where all students, regardless of their physical, intellectual, social, emotional, linguistic, or other conditions, are welcomed and supported in mainstream education settings. This framework seeks to ensure that every student can participate fully and achieve their potential without discrimination or exclusion (UNESCO, 2020). The practice of inclusive education emphasizes the importance of creating learning environments that accommodate diverse learning needs, fostering a sense of belonging, and promoting equal access to educational opportunities. However, despite significant policy advancements, there remains a critical gap in the practical implementation of inclusive education, particularly in low-resource settings where access to appropriate

materials and teacher training is limited (Santos & Serpa, 2020). This shortfall is part of a larger challenge faced by educational systems in many developing nations, where limited resources and infrastructure inhibit the realization of inclusive education ideals.

Digital literacy, on the other hand, encompasses the skills required to effectively and critically navigate, evaluate, and create information using a range of digital technologies. This includes not only the ability to use digital tools and platforms but also the competence to understand and utilize digital information in a meaningful way (UNESCO, 2018). In today's interconnected world, digital literacy goes beyond basic computer skills and extends into critical thinking, the ethical use of information, and the ability to collaborate effectively in online spaces (Ng, 2020). However, many educational institutions, particularly in developing nations, face significant barriers to integrating digital literacy into their curricula, including limited infrastructure, insufficient teacher training, and unequal access to technology (Hollands & Tirthali, 2020). This gap in access to technology and digital literacy training exacerbates educational inequalities, creating a digital divide that disproportionately impacts students from marginalized communities.

The integration of inclusive education and digital literacy is essential for preparing students for the demands of the digital age. This combination promotes not only equitable access to educational resources but also equips students with the necessary skills to thrive in a technologically-driven world. Inclusive education ensures that no learner is left behind, while digital literacy prepares them to actively participate in the digital economy and society. Nevertheless, a significant problem remains in the form of infrastructural limitations and inadequate teacher preparedness, particularly in regions like Nigeria, where access to digital tools and inclusive practices is unevenly distributed. Without addressing these systemic issues, students from marginalized or under-resourced backgrounds are at risk of being left further behind, both in terms of academic success and digital competence (Iwu, 2021). This widening gap underscores the urgent need for strategic interventions that not only promote inclusivity but also ensure the development of critical digital skills across diverse educational settings (Cruz-Jesus, Oliveira, & Bacao, 2020).

As the world advances further into the 21st century, the need for developing essential skills for the digital age has become increasingly urgent. The digital era demands more than just basic technical proficiency; it requires a comprehensive set of skills that enable individuals to

effectively navigate, interpret, and contribute to the digital landscape. These essential skills include digital problem-solving, online collaboration, and the ability to adapt to new technologies and platforms as they emerge (Martin, Grudziecki & Punyasavatsut 2019). Fostering these competencies is vital not only for individual success but also for creating an informed, collaborative, and innovative society that can meet the demands of a rapidly changing digital environment. However, the challenge lies in ensuring that these skills are accessible to all students, regardless of their socio-economic background or physical abilities. Without deliberate efforts to address these challenges, the growing digital divide will continue to pose significant barriers to achieving truly inclusive and equitable educational systems.

Despite the increasing recognition of the importance of both inclusive education and digital literacy, their full integration into educational systems remains limited, particularly in low- and middle-income countries. In Nigeria, for instance, the lack of sufficient digital infrastructure, inadequate teacher training, and inequitable access to digital devices pose significant barriers to the effective implementation of these concepts (Iwu, 2021). Without addressing these systemic issues, students from marginalized backgrounds are at risk of falling further behind, both in terms of their academic achievements and their ability to navigate the digital world.

Theoretical Foundations

Constructivist Theory: Constructivism, championed by theorist Piaget in the 1920s and 1930s posits that learning is an active process where individuals construct their own understanding and knowledge through experiences and reflections. In the context of inclusive education, this theory emphasizes the importance of engaging all students, including those with diverse needs, in meaningful learning experiences. Technology, including digital tools, facilitates this process by providing diverse modalities for students to access and interact with information, enabling them to build their own knowledge frameworks (Coiro & Dobler, 2019).

Social Justice Theory: Social justice theory, as articulated by Rawls in (1979) underlines the need for equitable access to educational resources and opportunities for all students, regardless of their background or abilities. In the digital age, this theory aligns with the concept of digital literacy, which advocates for equal access to digital technologies and the skills to use them effectively. Inclusive education seeks to remove barriers and promote participation, ensuring that all students have the necessary digital literacy skills to thrive in an increasingly technology-driven world (Hollands & Tirthali, 2020).

Conceptual Foundations

Inclusive Education: Inclusive education refers to an educational philosophy that values diversity and promotes the participation of all students in mainstream classrooms. It challenges traditional paradigms that separate students based on perceived abilities and instead advocates for a cohesive learning environment where all learners, including those with disabilities, can thrive. The United Nations Educational, Scientific and Cultural Organization (UNESCO) emphasizes that inclusive education is not only about physical presence in classrooms but also about providing the necessary supports and resources to ensure meaningful participation (UNESCO, 2017).

Digital Literacy Digital literacy encompasses a set of competencies required to effectively navigate, evaluate, and create information using digital technologies. It goes beyond mere technical skills to include critical thinking, creativity, and the ability to communicate and collaborate in online environments. In the context of inclusive education, digital literacy equips students with essential skills needed to engage with digital content, thereby enhancing their learning experiences and fostering participation in society (Ng, 2020).

Essential Skills for the Digital Age: Essential skills in the digital age include critical thinking, problem-solving, communication, and collaboration. These skills are necessary for students to thrive in a technology-driven world and are closely linked to both inclusive education and digital literacy. Integrating these skills into educational curricula ensures that all students, regardless of their background or abilities, are prepared for future challenges (Martin, Grudziecki, & Punyasavatsut, 2019).

Concept of Inclusive Education

Inclusive education is a philosophy and approach that emphasizes the participation and learning of all students, including those with disabilities, within regular mainstream classrooms. It aims to dismantle barriers to access and ensure that every student, irrespective of their background, abilities, or differences, receives a high-quality education in an inclusive and supportive environment (UNESCO, 2009). This approach fosters diversity, equity, and social inclusion within the educational system by affirming that all students have the right to engage with and benefit from the general education curriculum. It is an education that seeks to ensure that all students are educated in a manner that respects their individual needs and contributions. It focuses on fostering an inclusive school culture where all student, including those with diverse

needs, are active participants in the educational community. Thus, benefitting from shared learning experiences (Mitchell, 2014).

As UNESCO (2017) highlights, inclusive education ensures that all students are welcomed into their neighborhood schools, attending age-appropriate classes and being supported to learn, contribute, and participate fully in school life. This philosophy embraces the diversity of students, including those with disabilities, diverse cultural backgrounds, and varied learning styles, recognizing that such diversity enhances the learning experience.

Impact of Inclusive Education

Stigma, accessibility issues in the workplace, lower rates of high school and college completion can negatively impact employment outcomes for adults with learning issues. Inclusive education can have a profound positive impact on employability of graduates with disabilities. Inclusive education can impact on special needs graduate in the following aspects as noted by Carter, Asmus, Moss & Horne (2012):

Improved academic achievement: Inclusive classrooms often lead to improved academic outcomes for students with disabilities, as they benefit from access to the general education curriculum and effective instructional strategies. In inclusive classrooms, students with disabilities interact with each other. This interaction can lead to improved academic achievement because it fosters positive peer relationships and cooperative learning. When students with disabilities are included in regular classrooms, there is less stigmatization and labeling. This leads to improved self-esteem and reduced anxiety among students, which can positively impact their ability to learn and achieve academically.

Enhanced social skills and peer relationships*: Carter, et al (2012) emphasized that students with disabilities in inclusive settings have opportunities to develop social skills and build meaningful relationships with their peers. Inclusive education brings students with diverse abilities and backgrounds into regular classrooms. This environment promotes increased social interaction among students. Students with disabilities have more opportunities to interact with their peers without disabilities, which can lead to the development of social skills and the formation of positive peer relationships.

Increased tolerance and empathy: generally developing peers in inclusive settings often develop greater tolerance, empathy, and understanding of individual differences. Inclusive classrooms promote a sense of belonging and community among all students. When students feel like they are part of a supportive community, they are more likely to exhibit tolerance,

empathy, and acceptance towards their peers. In inclusive settings, students learn to work together and resolve conflicts collaboratively.

Preparation for a diverse society: Inclusive education equips all students with the skills and attitudes needed to live and work in a diverse society, promoting inclusivity beyond the classroom. Inclusive education promotes active citizenship and civic engagement by teaching individuals with special needs about their rights and responsibilities in a diverse society.

Reduced stigmatization*: Inclusive education emphasizes providing equal opportunities for all students to access a high-quality education. When students with special needs succeed academically and socially, it challenges stigmatizing beliefs and attitudes. It normalizes the presence of students with special needs in general education settings. When these students are integrated into regular classrooms, their differences become less stigmatized as they are seen as a natural part of the diverse student population.

Literacy in the Digital Age

Literacy is the ability to read and write (UNESCO, 2017). It involves understanding how written symbols relate to sounds, so you can read, speak, and comprehend written words. Essentially, literacy means knowing how to connect sounds with written letters to make sense of written text (Vlieghe, 2015). It is a skill that people, both children and adults, spend years developing. Over time, literacy has become much more common. Today, about 81% to 90% of people around the world can read and write, depending on their age and gender (UNESCO, 2016). What was once a skill for a small, elite group is now widespread. Literacy allows us to record, preserve, and share information easily and helps us keep track of details over time. In the digital age, literacy has evolved beyond traditional reading and writing to encompass a broader set of skills essential for navigating, interpreting, and creating information using digital technologies. This expanded concept of literacy, often referred to as digital literacy, integrates traditional literacy skills with new competencies required to function effectively in a digital environment.

Digital Literacy

More broadly, digital literacy is defined as the capacity to interpret and understand information from digital sources and to produce contents in various digital formats (Bawden, 2008). Digital literacy involves more than the ability to operate digital devices. It encompasses a range of skills, including the ability to critically evaluate digital contents, create and communicate information through various digital formats, and understand the ethical implications of digital interactions (Eshet-Alkalai, 2012). As digital technologies continue to permeate all aspects of life, literacy in the digital age requires individuals to adapt and acquire skills that will enable

them to manage and make sense of the vast amounts of information available online. Acquiring digital skills enables learners to manage an ever-expanding array of information which are crucial for both academic success and professional competence in a continuously evolving digital environment (Mohammadyari & Singh, 2015).

Impact of Digital Literacy

Enhanced access to information: Digital literacy empowers individuals to effectively search for, access, and utilize a vast array of information available online. This capability supports informed decision-making and allows users to acquire knowledge on diverse topics quickly. With digital skills, people can engage with a wealth of resources, including academic journals, online courses, and databases that were previously less accessible (Bawden, 2008).

Improved educational outcomes: In educational settings, digital literacy enhances learning by enabling students to engage with interactive tools, access educational resources, and collaborate with peers online. Students who are digitally literate can better navigate educational technologies, participate in virtual classrooms, and complete assignments using digital tools, contributing to a more engaging and effective learning experience (Hobbs, 2017).

Increased employability and career development: Digital literacy is crucial for career development in today's job market. Proficiency with digital tools and platforms are often a prerequisite for many jobs, making digital skills a key factor in employability. Employees who are digitally literate can adapt to new technologies, communicate effectively through digital channels, and leverage digital tools to enhance productivity and innovation (Ng, 2012).

Enhanced communication and collaboration: Digital literacy facilitates effective communication and collaboration across various digital platforms. Skills in using email, social media, and collaboration tools enable individuals to connect with others, share information, and work together on projects regardless of geographical distances. This capability is vital for both personal interactions and professional teamwork (Eshet-Alkalai, 2012).

Empowerment and participation: Digital literacy promotes active participation in the digital society by enabling individuals to engage with online communities, contribute to discussions, and access services and opportunities. It empowers people to be informed digital citizens, exercise their rights online, and participate in civic activities and social movements (Dede, 2010).

Integration of Inclusive Education and Digital Literacy in the Digital age

The intersection of inclusive education and digital literacy forms a robust conceptual framework that aims to create equitable, accessible, and effective learning environments for all students. This integration is pivotal in ensuring that every learner, regardless of their abilities or background, can fully participate in and benefit from educational opportunities in the digital age. Ng (2012) describes this integration necessary due to:

Accessibility: The framework emphasizes the need for accessible digital tools and resources that cater for diverse learners. This includes designing digital content that are compatible with assistive technologies, ensuring that students with disabilities can access and engage with educational materials.

Equity: Digital literacy can help bridge gaps in educational opportunities by providing equal access to information and learning resources. This principle aligns with inclusive education's goal of ensuring that all students, regardless of their socioeconomic background, have the tools they need to succeed.

Personalized learning: Digital tools can facilitate personalized learning experiences by adapting to individual student's needs and learning styles. This is particularly beneficial in inclusive education, where students may require different levels of support and intervention.

Collaboration and communication: The framework encourages the use of digital platforms that promote collaboration and communication among students. These tools can help build inclusive communities where students learn to work together, share ideas, and support each other's learning journeys.

Curriculum design: Integrate digital literacy into the curriculum in ways that support inclusive education goals. This involves creating lesson plans that use digital tools to enhance learning while accommodating the diverse needs of students.

Assistive technologies: Utilize assistive technologies to support students with disabilities. These technologies can range from screen readers and speech-to-text software to more advanced tools that offer personalized learning experiences.

Digital Literacy Skills Needed for Inclusive Education

Incorporating digital literacy into inclusive education requires specific competencies that ensure all students can engage with and benefit from digital tools and resources. These competencies help create equitable learning opportunities and support diverse educational

needs. The following digital literacy competencies are essential for effective inclusive education:

- **Basic Digital Literacy**

Basic digital literacy refers to the foundational skills and knowledge needed to use digital devices, navigate digital environments, and interact with digital contents effectively. It is an essential competency in the modern world, enabling individuals to perform everyday tasks, communicate, and access information using technology (Hobbs 2017). Koltay (2011) considers it as the gateway to more advanced digital skills and is essential for participating fully in modern society. By mastering device operation, navigating software applications, browsing the internet safely, communicating digitally, managing files, and troubleshooting issues, individuals can effectively engage with digital tools and resources. As technology continues to evolve, maintaining and updating these basic skills will be crucial for keeping pace with new digital developments. Ng (2012) highlights the basis component of basic digital literacy as device operation, navigating software applications, internet browsing and online safety, file management, basic trouble shooting, information literacy, digital content creation and cyber security:

- **Device operation**: **Device operation** involves the skills and knowledge required to use digital devices effectively. Understanding hardware is the first step in device operation. This includes knowing how to power devices such as computers, tablets, and smartphones on and off safely. Familiarity with basic hardware components, like keyboards, mice, touchpads, touchscreens, and peripherals such as printers and external drives, is essential. Additionally, understanding connectivity options, such as Wi-Fi, Ethernet, Bluetooth, and USB, is vital for integrating devices into various digital environments. Proficiency in device operation is fundamental for effectively engaging with digital technology.

- **Navigating software applications**: Navigating software applications is a fundamental component of basic digital literacy, encompassing the skills required to use various software tools and applications effectively. Proficiency in this area enables individuals to perform a wide range of tasks, from word processing to data analysis, and to utilize technology efficiently in both personal and professional contexts. Understanding how to use common software applications is essential. This includes word processors such as Microsoft Word, which are used for creating and editing documents. Word processors enable users to produce text documents with various formatting options, incorporating elements such as images, tables, and hyperlinks. Spreadsheets, like Microsoft Excel, are another critical application.

- **Internet Browsing and Online Safety**

Proficiency in using web browsers is fundamental to internet browsing. Web browsers like Google Chrome, Mozilla Firefox, Safari, and Microsoft Edge are tools that allow users to access the internet. Knowing how to use these browsers includes understanding how to open and close tabs, bookmark favorite websites, and manage browser settings for an optimized experience (Bawden 2008). Effective use of search engines is also crucial. Search engines like Google, Bing, and Yahoo help users find information on the internet. Understanding how to use keywords and search operators (like quotation marks for exact phrases or minus signs to exclude terms) can significantly enhance search efficiency and accuracy.

Online safety encompasses practices and behaviours that protect users from digital threats such as viruses, malware, phishing, and identity theft. One fundamental aspect is recognizing secure websites. Secure websites typically use HTTPS rather than HT]TP, indicating that the connection is encrypted. Looking for a padlock icon in the browser's address bar is a simple way to identify secure sites. Creating and managing strong passwords is another critical online safety practice. Strong passwords should be unique, complex, and include a mix of letters, numbers, and symbols. Using password managers can help in generating and storing strong passwords securely.

- **File Management**

File management is a critical digital literacy skill that underpins successful inclusive education in the digital age. It involves organizing, storing, and retrieving digital files efficiently, ensuring that learners can manage their educational resources effectively (Zheng, Warschauer, & Farkas, 2013). This involves creating, saving, retrieving, and managing files, understanding different file formats, and using cloud storage solutions. According to Livingstone (2011) file management contributes to inclusive education in the following ways: organization, accessibility, collaboration, independence, efficiency.

Organization: Effective file management involves creating, naming, and organizing files and folders systematically. This skill helps students keep their digital workspace tidy, making it easier to find and manage educational materials. Studies have shown that organized digital environments reduce cognitive load and enhance learning efficiency.

Accessibility: Proper file management ensures that educational resources are readily available and accessible to all students, including those with disabilities. Organized files can be easily located and converted into accessible formats (e.g., Braille, large print, audio) to accommodate different learning needs.

Collaboration: Inclusive education often involves group work and collaborative projects. Efficient file management allows students to share and collaborate on documents seamlessly, regardless of their physical location or individual needs. Cloud storage solutions like Google Drive and Microsoft One Drive facilitate real-time collaboration, ensuring equitable participation.

Independence: Teaching students file management skills fosters independence, allowing them to navigate digital environments confidently. This is particularly important for students with special educational needs, as it empowers them to take control of their learning and reduces reliance on educators and support staff.

Efficiency: Efficient file management minimizes the time spent searching for documents, maximizing learning time. Students learn to use folders, labels, and search functions to keep their work organized, which is especially beneficial for those who may struggle with organization due to cognitive or developmental challenges.

- **Basic Troubleshooting**

Basic troubleshooting is a critical digital literacy skill essential for inclusive education. It involves diagnosing and resolving common technical issues that may arise with digital devices and software (Pfleeger & Atlee, 2010). By equipping students and educators with troubleshooting skills, educational environments become more adaptive to the diverse needs of all learners. The ability to solve common technical problems, may include skills such as restarting devices, updating software, and seeking help for technical issues. Furthermore, Pfleeger & Atlee (2010) highlight them as: identifying common problems, systematic problem solving, preventive maintenance, empowerment and independence;

Identifying common problems: Understanding the most frequent technical issues that can occur with hardware (e.g., computers, tablets, and printers) and software (e.g., operating systems, applications, and online platforms). This includes recognizing issues like frozen screens, unresponsive applications, connectivity problems, and error messages.

Systematic problem-solving: Developing a systematic approach to problem-solving, which includes steps such as:

i. Diagnosis: Identifying the symptoms and possible causes of the issue.

ii. Testing: Performing basic tests to isolate the problem, such as restarting the device, checking connections, or running diagnostic tools.

iii. Resolution: Implementing solutions based on the diagnosis, such as updating software, adjusting settings, or reinstalling applications

iv. Resource utilization: Knowing how to use available resources effectively to troubleshoot issues, including:

v. Help menus and documentation: Accessing and using built-in help menus and user manuals.

vi. Technical support services: Knowing when and how to seek assistance from technical support services or IT professionals.

Preventive maintenance: Understanding and performing regular preventive maintenance tasks to minimize the likelihood of technical issues. This includes keeping software updated, regularly scanning for viruses and malware, and managing system resources efficiently.

Empowerment and independence: Teaching students and educators basic troubleshooting skills empowers them to solve minor technical issues independently, reducing downtime and increasing productivity. This is particularly important in inclusive education settings, where timely resolution of technical issues can significantly impact learning outcomes for students with special needs.

- **Information Literacy**

Information literacy is a crucial digital literacy skill that enables individuals to effectively find, evaluate, and use information. Information literacy ensures that all learners can navigate the vast amount of information available digitally, making informed decisions and contributing meaningfully to their educational experiences (Ribble, 2015). Information literacy involves the ability to locate, evaluate, and use information from various digital sources. Hobbs (2010) noted that information literacy skills such as effective search techniques, critical assessment of information credibility, and proper citation practices is crucial for making informed decisions and conducting research. Ribble (2015) noted the following important aspects of information literacy that are essential to the students:

Critical evaluation: Teaching students to assess the credibility of information sources, including authorship, publication date, and the reputation of the publisher. This skill helps prevent the spread of misinformation and ensures that students rely on accurate and reliable information

Bias detection: Understanding how to identify bias in information sources and recognizing how perspective agenda can influence contents. This is crucial for developing critical thinking and ensuring a balanced understanding of topics.

Effective searching: Knowing how to choose and use effective keywords and phrases to find relevant information quickly. This involves understanding how search engines work and how to refine search queries for better results.

Advanced search techniques: Utilizing advanced search techniques, such as Boolean operators (AND, OR, NOT), filters, and specialized search engines, to narrow down search results and find specific information.

Ethical use of information: Understanding the importance of citing sources correctly to give credit to original authors and avoid plagiarism. This includes knowledge of different citation styles and the ethical use of information. Recognizing intellectual property rights and respecting them by not unlawfully copying or distributing copyrighted material.

Digital Content Creation

Digital content creation is a vital digital literacy skill that enables learners to express themselves,

share knowledge, engage with their peers and educators in meaningful ways. This skill empowers students with diverse needs and abilities to participate actively in the learning process and contribute creatively to their educational communities (Green & Young, 2020). The ability to create and manage digital content is an important skill in the digital age. This includes producing various forms of media such as text, images, videos, and presentations (Hrastinski, 2019). Digital content creation allows individuals to express themselves creatively and communicate ideas effectively through,

Multimodal expression: Students should be proficient in creating content using different formats, such as text, audio, and visual media. This enables them to communicate their ideas effectively and cater for diverse learning preferences and needs (Coiro et al., 2019). Creating videos helps students develop storytelling skills and allows for a richer presentation of ideas. Video content can be particularly engaging and accessible for students with different learning styles (Green & Young, 2020).

Online collaboration platforms: Using tools like Google Docs, Microsoft Teams, and other collaborative software allows students to work together on projects, share ideas, and provide feedback in real-time. These tools foster collaboration and ensure that all students, including those with disabilities, can contribute equally (Hrastinski, 2019).

Social media and digital publishing: Understanding how to use social media and digital publishing platforms responsibly enables students to share their work with a broader audience and engage in digital communities (Greenhow & Askari, 2017).

Graphic design: Proficiency in graphic design software, such as Adobe Photoshop or Canva, allows students to create visually appealing and informative content. This skill is important for making learning materials more engaging and accessible (Fleischmann & Daniel, 2020).

Coding and programming: Basic knowledge of coding and programming can empower students to create interactive contents, such as websites and apps, enhancing their problem-solving skills and preparing them for future technological advancements (Kafai & Burke, 2015).

Narrative techniques: Digital storytelling involves using digital tools to tell stories, which can be a powerful way for students to connect with the material and with each other. This technique supports the development of empathy and creativity (Robin, 2016).

Interactive media: Creating interactive contents, such as games and simulations, allows students to engage deeply with the material and explore complex concepts in an immersive way (Gee, 2013).

- **Cybersecurity Awareness**

Cybersecurity awareness is a crucial digital literacy skill that involves understanding the principles and practices necessary to protect digital information and systems from various cyber threats. Cybersecurity awareness ensures that all students and educators are equipped with the knowledge and tools to protect themselves and their digital environments from potential risks, thereby creating a safe and secured learning environment (Solove, 2021). Cybersecurity awareness is crucial for protecting personal and professional information from digital threats. This includes understanding basic principles of online security, such as using strong passwords, recognizing phishing attempts, and safeguarding sensitive data. Solove (2021) identified the aspects in cyber security as;

Understanding types of threats: Students and educators need to be aware of different types of cyber threats, such as phishing, malware, ransomware, and social engineering. Understanding these threats helps in recognizing potential risks and implementing protective. For example, phishing involves fraudulent attempts to obtain sensitive information by disguising as a trustworthy entity, while malware refers to malicious software designed to damage or disrupt systems.

Recognizing red flags: Identifying common indicators of cyber threats, such as suspicious emails, unusual pop-ups, or unexpected system behavior and essential for early detection and prevention of security incidents.

Password management: This entails educating students and educators about the importance of using strong, unique passwords and employing password management tools to securely store and manage credentials. This includes the use of multi-factor authentication (MFA) to add an extra layer of security.

Secure browsing: Promoting safe browsing practices, such as avoiding clicking on unknown links, verifying website security (e.g., checking for HTTPS), and using reputable security software to protect against threats.

Personal information: This identifies teaching the importance of protecting personal information online and understanding how to manage privacy settings on social media and other digital platforms. This includes being cautious about sharing personal details and recognizing the implications of oversharing.

Recognizing and reporting incidents: Training on how to respond to and report cybersecurity incidents, such as data breaches or suspicious activities. This includes knowing whom to contact (e.g., IT support or cybersecurity professionals) and what steps to take to mitigate damage.

Conclusion

Incorporating inclusive education and digital literacy into educational frameworks is vital for equipping students with the essential skills needed in the digital age. As the world becomes increasingly digital, the ability to navigate, evaluate, and create digital content, while ensuring cybersecurity and understanding privacy, becomes fundamental to academic and personal success. **Inclusive education** focuses on creating a learning environment where all students, regardless of their abilities or backgrounds, can thrive. By integrating **digital literacy skills** such as information literacy, digital content creation and cybersecurity awareness, educators can ensure that student have the opportunity to engage meaningfully with educational content. This approach not only supports diverse learning needs but also prepares students for a world where digital skills are critical.

Recommendations

The following recommendations are proffered for institutional managers and educators to implement:

1. Incorporate digital literacy skills across subjects and grade levels to ensure that all students develop these competencies. This includes teaching information literacy, digital content creation, and cybersecurity awareness as integral parts of the curriculum

2. Invest in and integrate assistive technologies that support various learning needs, such as text-to-speech software, screen readers, and adaptive keyboards. This helps ensure that digital contents are accessible to students with disabilities.

3. Encourage the use of digital collaboration tools to facilitate group work and peer interaction. These tools support diverse learning needs and help build essential skills for working in digital environments.

4. Offer ongoing professional development opportunities for educators to enhance their digital literacy and teaching strategies. This includes training on digital tools, UDL principles, and effective ways to integrate digital literacy into the classroom.

5. Continuously assess the effectiveness of digital literacy programmes and inclusive practices. Use feedback from students and educators to make necessary adjustments and improvements, ensuring that the educational environment remains responsive to evolving needs and technological advancements.

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Assessing the Perceived Benefits of Implementing Artificial Intelligence Technologies on Students' Academic Performance in Secondary Schools in Port Harcourt Metropolis

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Abstract

The study investigated the perceived benefits of implementing artificial intelligence technologies on students' academic performance in secondary schools in Port Harcourt Metropolis. Three research objectives, three research questions and three hypotheses guided the study. The study adopted a descriptive survey design with a population of 27,082 teachers and students comprising 25,077 students and 2,005 teachers in the 35 public senior secondary schools in Port Harcourt and Obio/Akpor Local Government Areas of Rivers State. The sample size of the study was 727 respondents comprising 394 students and 333 teachers. The sample size was determined using Taro Yamene's formula. The multi-stage sampling technique was adopted in selecting the sample size. The instrument for the study was a self-designed questionnaire titled; "Assessing the Perceived Benefits of Implementing Artificial Intelligence Technologies on Students' Academic Performance Questionnaire (APBIAITSAPQ)'. The instrument was validated by experts in educational research. The reliability of the instrument gave a Cronbach Alpha index of 0.84 which was considered reliable. Mean and standard deviation were used to answer the research questions while z-test statistics was used to test the formulated null hypotheses at 0.05 level of significance. The findings of the study revealed that, improved access to resources, data-driven insights and efficient administrative task through A.I technology implementation influence students' academic performance in public secondary schools in Port Harcourt Metropolis. The study recommended that, Federal and State government, Ministry of education, Curriculum planners and principals should implement A.I technology in public schools to improve students' academic performance.

Keywords: Academic Performance, Artificial Intelligences, Assessing, Implementation, Secondary Schools, Technologies.

Introduction

The introduction of Artificial Intelligence (AI) technologies into educational settings has heralded a new frontier in pedagogy, fundamentally reshaping teaching and learning processes. In public senior secondary schools, particularly in metropolitan areas like Port Harcourt, AI tools have begun to play a pivotal role in enhancing students' academic experiences and outcomes (Williamson, Eynon, & Potter, 2022). AI technologies, ranging from intelligent tutoring systems to predictive analytics, offer personalized learning experiences that are tailored to meet the individual needs of students, thus promoting more effective learning (Luckin, Holmes, Griffiths, & Forcier, 2022). By analyzing vast datasets,

AI can provide insights into students' learning behaviors, potentially identifying areas where students struggle and suggesting targeted interventions. This capability not only helps educators personalize instruction but also empowers students to take charge of their learning, fostering a self-directed and engaged approach to their studies. The integration of AI in the classroom is anticipated to bridge gaps in educational attainment by providing equitable access to resources and knowledge, assisting in reducing instructional disparities that are often found in public educational institutions (West, 2023).

The perceived benefits of AI in education extend beyond immediate academic performance. These benefits encapsulate broader educational outcomes, such as improved critical thinking, increased student satisfaction, and the development of a technologically savvy workforce ready to meet the challenges of a digital economy (Ministry of Education, Port Harcourt, 2024). As educators and policymakers in Port Harcourt Metropolis explore the full potential of AI, understanding students' perceptions of its benefits is crucial. This understanding can inform strategies to maximize its effectiveness in enhancing educational outcomes and in overcoming existing barriers to its adoption (UNESCO, 2023).

The importance of implementing AI in educational institutions is underscored by its potential to bridge educational gaps. In regions like Port Harcourt, where resources seem to be limited, AI technologies can provide scalable solutions that deliver quality education across diverse settings (Rivers State Ministry of Education, 2024). By leveraging AI, educational stakeholders can ensure that learning is accessible, inclusive, and equitable, addressing disparities often present in public educational systems. Moreover, the integration of AI into educational frameworks aligns with the global shift towards digital literacy and competencies necessary for the 21st-century workforce. As Luckin, Holmes, Griffiths, & Forcier (2022) note, preparing students for future careers requires equipping them with experience and proficiency in using advanced technologies, including AI. Therefore, the implementation of AI not only benefits current academic performance but also prepares students for future challenges and opportunities.

The perceived benefits of AI in enhancing student performance signify a transformative shift in educational paradigms. This shift, when effectively harnessed, could profoundly impact not just individual learners but also the educational landscape as a whole (West, 2023). Therefore, it is essential to assess these perceptions thoroughly to support informed decision-making in the implementation of AI technologies in the educational sector. Artificial Intelligence (AI) refers

to the simulation of human intelligence in machines, designed to think and act like humans. This burgeoning field encompasses various technologies that enable machines to learn from experience, adapt to new inputs, and perform tasks that typically require human intellect, such as reasoning, problem-solving, and understanding natural language. The rapid advancements in AI are reshaping various sectors, including healthcare, finance, entertainment, and education. As AI continues to evolve, its impact on society becomes increasingly profound, leading to discussions about its potential benefits and challenges (Woolf, 2021).

Improved access to resources through Artificial Intelligence (AI) refers to the ability to efficiently and effectively find, utilize, and manage a wide range of educational materials and tools thanks to AI technologies (Provost, & Fawcett, 2013). Data-driven insights through Artificial Intelligence (AI) refer to the valuable information and conclusions derived from analyzing large volumes of data using AI algorithms and techniques. These insights help organizations and individuals make informed decisions based on patterns, trends, and anomalies identified within the data (Luckin, et al., 2016). Efficient administrative tasks through Artificial Intelligence (AI) refer to the automation and optimization of routine and repetitive operational processes within organizations using AI technologies. This efficiency can significantly enhance productivity, reduce errors, and free up valuable time for staff to focus on more strategic initiatives (Huang, & Rust, 2021). The perceived benefits of AI in enhancing student performance signify a transformative shift in educational paradigms. This shift, when effectively harnessed, could profoundly impact not just individual learners but also the educational landscape as a whole. Therefore, it is essential to assess these perceptions thoroughly to support informed decision-making in the implementation of AI technologies in the educational sector.

Statement of the Problem

The integration of artificial intelligence (AI) technologies in education promises a transformative impact, particularly with respect to enhancing student academic performance. However, while AI's potential benefits are widely discussed in global educational forums, there is a pressing need to contextualize these discussions within specific regional environments to understand their nuanced implications. Port Harcourt Metropolis, a rapidly growing urban area in Nigeria, presents a unique context where secondary schools face challenges such as varying levels of resource availability, technological infrastructure, and educational readiness among both educators and students.

Despite the global advocacy for AI integration in classrooms, there is a marked gap in empirical research assessing the perceived benefits of these technologies specifically within the secondary schools of Port Harcourt Metropolis. This gap underscores the need for localized studies that provide insights into how students, educators, and administrators perceive the value and impact of AI on academic performance. Such perceptions are crucial, as they not only shape the successful implementation of AI technologies but also influence the educational strategies and investments made by stakeholders. It's for these reasons the researcher carried out the study, to examine what are the perceived benefits of implementing Artificial intelligence technologies on students' academic performance in secondary schools in Port Harcourt Metropolis? And to proffer solutions were necessary.

Purpose of the Study

The purpose of this study was to examine, the perceived benefits of implementing Artificial intelligence technologies on students' academic performance in secondary schools in Port Harcourt Metropolis. Specifically, the objectives of the study are to:

1. Determine the extent to which improved access to resources through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis.

2. Find out the extent to which data-driven insights through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis.

3. Ascertain the extent to which efficient administrative task through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis.

Research Questions

The following research questions guided the study:

1. To what extent does improved access to resources through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis?

2. To what extent does data-driven insights through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis?

3. To what extent does efficient administrative task through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis?

Hypotheses

The following null hypotheses were used for the study and tested at 0.05 level of significance:

1. There is no significant difference in the mean ratings of teachers and students on the extent to which improved access to resources through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis.

2. There is no significant difference in the mean ratings of teachers and students on the extent to which data-driven insights through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis.

3. There is no significant difference in the mean ratings of teachers and students' teachers on the extent to which efficient administrative task through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis.

Literature Review

Concept of Artificial Intelligence (AI)

Artificial Intelligence (AI) refers to the simulation of human intelligence in machines, designed to think and act like humans. This burgeoning field encompasses various technologies that enable machines to learn from experience, adapt to new inputs, and perform tasks that typically require human intellect, such as reasoning, problem-solving, and understanding natural language. The rapid advancements in AI are reshaping various sectors, including healthcare, finance, entertainment, and education. As AI continues to evolve, its impact on society becomes increasingly profound, leading to discussions about its potential benefits and challenges (Woolf, 2010).

Benefits of Implementing Artificial Intelligence in Secondary Schools

Integrating AI into secondary schools offers numerous advantages that can enhance the learning experience for students and support educators in their teaching efforts (Zhang, & Zheng, 2022). Some key benefits include:

i. **Personalized Learning:** AI can analyze individual student performance and learning styles, providing tailored educational experiences that cater to each student's needs. This personalization can help students master subjects at their own pace.

ii. **Efficient Administrative Tasks:** AI systems can automate routine administrative tasks, such as grading tests and managing schedules, allowing teachers to focus more on instruction and student engagement.

iii. **Enhanced Engagement:** Interactive AI-driven tools and platforms can create dynamic learning environments that engage students more effectively than traditional teaching methods, making the learning process more enjoyable.

iv. **Immediate Feedback:** AI can provide instant feedback on assignments and assessments, helping students identify their strengths and weaknesses promptly, thus facilitating timely interventions.

v. **Access to Resources:** AI can curate a wealth of educational resources and materials, providing students and teachers with quick access to relevant information and learning tools that enhance the educational experience.

vi. Preparation for Future Careers: Introducing students to AI technologies equips them with the skills and knowledge required in a workforce increasingly reliant on these advancements, preparing them for future careers in a tech-driven world.

The implementation of AI in secondary education can create a more adaptive, engaging, and efficient learning environment, ultimately helping to foster a generation of learners who are better prepared for the challenges of tomorrow.

Concept of Students' Academic Performance

Students' academic performance refers to the level of achievement and success that students attain in their educational pursuits, typically measured through grades, test scores, and assessments. It encompasses various aspects of learning, including understanding of the subject matter, the ability to apply knowledge, and skills demonstrated in academic work (Tuck, 2018). Key components of academic performance include:

i. **Grades and Scores:** Academic performance is often quantified through grades in coursework, standardized test scores, and assessments. These numerical indicators reflect the students' mastery of material and their ability to meet educational standards.

ii. **Engagement and Participation:** Active participation in class discussions, group projects, and extracurricular activities can also indicate strong academic performance, as engaged students are more likely to comprehend and retain information.

iii. **Skill Development:** Academic performance is not just about grades; it also includes the development of critical thinking, problem-solving, and communication skills, which are essential for overall educational success.

iv. **Retention and Progression:** Academic performance can also be evaluated by students' ability to progress to higher levels of education, complete courses, and graduate within anticipated timeframes.

v. **External Factors:** Various social, economic, and environmental factors can influence students' academic performance. Support systems, such as family, peers, and educational resources, play significant roles.

Understanding and improving students' academic performance is crucial for educational institutions, as it affects not only individual students' futures but also the effectiveness of educational programs.

Concept of Improved Access to Resources through Artificial Intelligence (AI)

Improved access to resources through Artificial Intelligence (AI) refers to the ability to efficiently and effectively find, utilize, and manage a wide range of educational materials and tools thanks to AI technologies. Here are some key aspects of how AI enhances resource accessibility:

i. **Personalized Recommendations:** AI algorithms can analyze a student's learning patterns and preferences to recommend tailored resources such as articles, videos, and interactive simulations that match their specific needs, making it easier for them to access appropriate materials.

ii. **Curated Content:** AI can sift through vast amounts of information on the internet and curate high-quality educational resources, categorizing them based on relevance and difficulty. This saves time for both students and teachers, ensuring they find relevant and trustworthy resources more quickly.

iii. **Language Translation:** AI-powered tools can translate educational materials into different languages, enabling non-native speakers to access content in their preferred language. This inclusivity enhances learning opportunities for diverse student populations.

iv. **24/7 Availability:** AI-driven platforms can provide access to learning resources at any time, allowing students to study and explore topics at their own convenience, which is particularly beneficial for those with varied schedules.

v. **Interactive Learning Tools:** AI can facilitate the creation of interactive and immersive learning experiences, such as virtual simulations or gamified content, making it easier for students to engage with complex subjects and concepts.

vi.   **Research Assistance:** AI can assist students and educators in conducting research by quickly identifying relevant papers, publications, and data sets, enabling them to gather information more efficiently for projects and assignments.

By leveraging these capabilities, AI significantly enhances access to educational resources, enabling students and educators to have a richer, more supportive learning experience. This improved access can lead to better educational outcomes and a more equitable learning environment for all students.

Concept of Data-Driven Insights through Artificial Intelligence (AI)

Data-driven insights through Artificial Intelligence (AI) refer to the valuable information and conclusions derived from analyzing large volumes of data using AI algorithms and techniques. These insights help organizations and individuals make informed decisions based on patterns, trends, and anomalies identified within the data (Luckin, et al., 2016). Here's a closer look at what this means:

i.   **Analysis of Large Datasets:** AI can process and analyze vast amounts of structured and unstructured data swiftly, something that would be impractical for humans to do manually. This capability enables organizations to harness the power of big data.

ii.   **Pattern Recognition:** AI algorithms, particularly machine learning models, excel at identifying patterns and correlations within datasets. This allows for the discovery of relationships that may not be readily apparent, helping users understand underlying trends and behaviors.

iii.   **Predictive Analytics:** AI can use historical data to make predictions about future outcomes. For example, in education, AI can analyze previous student performance data to predict which students may need additional support, enabling proactive interventions.

iv.   **Enhanced Decision-Making:** By providing actionable insights derived from data, AI equips educators, administrators, and other stakeholders with the information needed to make informed decisions. This can lead to improved policies, targeted interventions, and more effective resource allocation.

v.   **Continuous Improvement:** As AI systems learn from new data over time, they can refine their insights and recommendations. This continuous learning process helps organizations adapt and improve their strategies based on the most current and relevant information. Data-driven insights generated through AI empower users by transforming raw data into meaningful information, leading to better decision-making and enhanced outcomes across various sectors, including education.

Concept of Efficient Administrative Tasks through Artificial Intelligence (AI)

Efficient administrative tasks through Artificial Intelligence (AI) refer to the automation and optimization of routine and repetitive operational processes within organizations using AI technologies. This efficiency can significantly enhance productivity, reduce errors, and free up valuable time for staff to focus on more strategic initiatives (Huang, & Rust, 2021). Here are some key elements of this concept:

i.   **Automation of Routine Tasks:** AI can automate processes such as scheduling meetings, processing invoices, managing email communications, and data entry. This minimizes the need for manual intervention, thereby saving time and reducing the likelihood of errors.

ii.   **Data Management and Analysis:** AI systems can efficiently organize, analyze, and retrieve data, making it much easier for administrators to manage large volumes of information. For instance, AI can track performance metrics or audit compliance with policies, streamlining decision-making processes.

iii. **Enhanced Communication:** AI-powered chatbots and virtual assistants can handle routine inquiries from staff or customers, providing immediate responses and support. This reduces the administrative burden on human resources while maintaining a high level of service.

iv.   **Resource Allocation:** AI can analyze administrative workflows and pinpoint areas for improvement, enabling better allocation of resources. This ensures that tasks are assigned based on availability and expertise, enhancing overall efficiency.

v.   **Predictive Capabilities:** With access to historical data, AI can forecast trends (like peak times for inquiries) that help administrators plan better. This foresight allows for proactive scheduling and resource management.

By employing AI in administrative tasks, organizations can achieve greater efficiency, leading to a more productive work environment.

Impact of AI on Academic Performance in Secondary Schools

Recent studies have investigated the role of Artificial Intelligence (AI) technologies in enhancing academic performance, especially in secondary schools. AI applications such as personalized learning platforms and automated tutoring systems have been found to contribute positively to students' learning outcomes. According to a study by Zhang et al. (2023), AI-powered learning tools tailored to students' learning styles and needs improve their academic performance by providing personalized, real-time feedback. This ensures that students grasp

concepts at their own pace, which is particularly beneficial for learners in diverse secondary school settings. In Port Harcourt Metropolis, AI technologies can help bridge the educational gap created by overcrowded classrooms and limited access to qualified teachers. AI's role in offering differentiated instruction, along with its ability to adapt to the learning needs of individual students, aligns with findings from Omojuwa et al. (2022) that indicate a direct correlation between AI-enhanced teaching strategies and improved academic performance in both public and private secondary schools.

AI and the Enhancement of Cognitive Skills in Secondary Education

The implementation of AI technologies has been shown to enhance various cognitive skills that are essential for academic achievement in secondary education. AI-driven learning platforms provide interactive simulations, problem-solving exercises, and real-time quizzes that stimulate critical thinking and improve students' cognitive engagement. A study by Olayemi et al. (2023) suggests that AI applications have been particularly effective in enhancing problem-solving abilities and cognitive flexibility, leading to improved performance in subjects like mathematics and science. In secondary schools in Port Harcourt, where students often face challenges such as lack of resources and insufficient individual attention, AI tools offer an innovative solution. For example, AI systems can track a student's progress and adjust content to suit their cognitive level, allowing for improved retention and deeper understanding. Such benefits have been shown to result in higher academic performance, particularly in STEM (Science, Technology, Engineering, and Mathematics) subjects (Nguyen & Li, 2022).

The Role of AI in Teacher Support and Students Academic Performance

The perceived benefits of AI technologies extend beyond direct student interaction to supporting teachers in their instructional practices, ultimately influencing students' academic performance. AI systems can assist teachers in grading, providing insights into student performance trends, and identifying areas of difficulty for students. According to a study by Adebayo and Owolabi (2023), AI tools can reduce the administrative burden on teachers, allowing them to focus on more individualized instruction. In secondary schools in Port Harcourt Metropolis, AI can help teachers optimize lesson planning by analyzing student data and recommending personalized learning interventions. This leads to improved instructional quality, which in turn boosts student performance. Additionally, the use of AI-powered systems for formative assessments ensures that students receive continuous feedback, helping them correct mistakes and strengthen areas of weakness (Ajayi et al., 2022). This collaborative

relationship between AI technologies and teachers has been shown to improve learning outcomes across various subjects.

AI's Role in Promoting Student Engagement and Motivation

One significant benefit of AI technologies in education is their ability to enhance student engagement and motivation, which are crucial factors in academic success. AI tools are designed to be interactive and adaptive, providing students with personalized learning experiences that keep them engaged. A study by Adams et al. (2024) found that AI-powered learning apps, such as gamified learning platforms, increased student motivation and participation in lessons, leading to improved academic performance. Students who used AI-driven platforms reported feeling more in control of their learning, as these tools offered immediate feedback and allowed for self-paced progress. In Port Harcourt Metropolis, where schools face challenges such as large class sizes and a lack of adequate learning resources, AI technologies can significantly boost students' intrinsic motivation. By making learning more enjoyable and relevant to each student's abilities, AI encourages active participation, which ultimately results in better academic performance (Bello & Moyo, 2023).

AI in Assessment and Feedback: Implications for Academic Performance

The integration of AI in student assessment processes is another perceived benefit that positively impacts academic performance. AI tools offer timely and accurate assessments that provide insights into students' strengths and weaknesses. According to a study by Chika et al. (2023), AI-based formative assessments, such as adaptive quizzes and instant feedback systems, allow teachers to identify struggling students early and intervene accordingly. In secondary schools in Port Harcourt Metropolis, AI-powered assessment systems have been implemented to streamline the evaluation process and provide personalized feedback. These tools allow teachers to focus on targeted interventions, thereby improving student performance in areas that are typically more challenging. Furthermore, students benefit from constant feedback that helps them refine their understanding of complex concepts, which has been shown to enhance both immediate and long-term academic performance (Nwachukwu & Eze, 2023).

AI and Equity in Education: Addressing Disparities in Students Academic Performance

AI technologies have the potential to address educational disparities, particularly in underfunded or resource-limited schools, such as those in Port Harcourt Metropolis. According to research by Ijeoma and Okafor (2022), AI applications can mitigate issues like the lack of qualified teachers and unequal access to educational resources. AI-driven tools enable students

to access quality education regardless of geographical location or socio-economic status. This technology makes learning resources available online, offering remote access to educational content and interactive learning activities. In areas like Port Harcourt, where some schools may struggle with outdated curricula and limited learning materials, AI can level the playing field by providing students with equal opportunities to succeed academically. The study found that AI adoption in secondary schools led to improved performance, particularly among students who previously lacked access to advanced learning materials (Afolabi & Adeoye, 2023).

Methodology

The study adopted a descriptive survey design with a population of 27,082 teachers and students comprising 25,077 students and 2,005 teachers in the 35 public senior secondary schools in Port Harcourt and Obio/Akpor Local Government Areas of Rivers State. The sample size of the study was 727 respondents comprising 394 students and 333 teachers. The sample size was determined using Taro Yamene's formula. The multi-stage sampling technique was adopted in selecting the sample size. The instrument for the study was a self-designed questionnaire titled; "Assessing the Perceived Benefits of Implementing Artificial Intelligence Technologies on Students' Academic Performance Questionnaire (APBIAITSAPQ)' Responses to the questionnaire items were structured on a four- point summated rating scale of: Very High Extent (VHE) – 4points, High Extent (HE) – 3points, Low Extent (LE) – 2points and Very Low Extent (VLE). The instrument was validated by experts in educational research. Reliability coefficients of 0.84, 0.83 and 0.85 were obtained for the various clusters of the instrument. The reliability of the instrument gave a Cronbach Alpha total index of 0.84 which was considered reliable. Mean and standard deviation were used to answer the research questions while z-test statistics was used to test the formulated null hypotheses at 0.05 level of significance. The null hypothesis was rejected and the alternate hypotheses accepted when the computed value was greater than the critical value at the significance level of 0.05. On the contrary, the null hypothesis was also accepted and the alternate hypotheses rejected when +the computed value is less than the critical table value.

Results Presentation

Research Question 1: To what extent does improved access to resources through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis?

Table 1: Mean Ratings on the Extent to which Improved Access to Resources through AI Implementation Influence Students' Academic Performance in Public Senior Secondary Schools in Port Harcourt Metropolis.

S/N	Questionnaire Items for	Students (394)	Teachers (333)

	Improved Access to Resources	$\bar{X}$	SD	Decision	$\bar{X}$	SD	Decision
1.	AI-driven platforms can provide students with round-the-clock access to learning materials and resources.	3.26	1.15	HE	3.18	1.09	HE
2.	AI cannot adapt educational content to match the student's proficiency levels and learning styles.	2.13	1.10	LE	2.28	1.17	LE
3.	AI systems can curate a diverse range of learning materials, making education more engaging.	3.20	1.18	HE	3.11	1.06	HE
4.	AI tools can help students quickly find and access the information they need for assignments or projects.	3.47	1.13	HE	3.43	1.09	HE
5.	AI can provide translation and language assistance, making educational resources accessible.	3.18	1.16	HE	3.28	1.04	HE
6.	AI can facilitate access to free or low-cost educational resources and courses, making education more affordable and accessible to a wider audience.	3.33	1.11	HE	3.26	1.19	HE
7.	AI-powered collaboration platforms can connect students with peers and instructors, fostering a collaborative learning environment.	3.21	1.15	HE	3.08	1.10	HE
	Grand Mean	**3.11**	**1.14**	**HE**	**3.09**	**1.11**	**HE**

Source: Field Survey, 2024.

Table 1 above revealed the extent to which improved access to resources through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis. Majority of the respondents agreed with all the items in the table except item 2. The grand mean scores of 3.11, 3.09 and standard deviation scores of 1.14 and 1.11 for students and teachers respectively indicate that improved access to resources through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis to a high extent. The answer to research question 1 therefore is that: student and teachers indicate that improved access to resources through AI implementation influence students' academic performance to a high extent.

Research Question 2: To what extent does data-driven insights through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis.

Table2: Mean Ratings on the Extent to Which Data-Driven Insights through AI Implementation Influence Students' Academic Performance in Public Senior Secondary Schools in Port Harcourt Metropolis.

S/N	Questionnaire Items for Data-Driven Insights	Students (394)		Teachers (333)	

		$\overline{X}$	SD	Decision	$\overline{X}$	SD	Decision
8.	AI can analyze individual student data to tailor the curriculum and learning activities to fit their unique needs.	3.30	1.08	HE	3.10	1.07	HE
9.	AI can identify signs of academic struggle early on, allowing educators to intervene and provide support before issues worsen.	3.01	1.12	HE	3.05	1.13	HE
10.	Data insights do not enhance students' engagement.	2.02	1.17	LE	2.10	1.15	LE
11.	AI analyze patterns in student data to inform curriculum development.	3.10	1.10	HE	3.20	1.14	HE
12.	AI-driven insights can guide schools inefficient resource allocation.	3.48	1.13	HE	3.41	1.17	HE
13.	AI can provide detailed and timely feedback to students, helping them understand their progress and areas for improvement.	3.31	1.07	HE	3.19	1.20	HE
14.	AI do not provide detailed and timely feedback to students.	2.15	1.11	LE	2.04	1.16	LE
	Grand Scores	**2.91**	**1.11**	**HE**	**3.01**	**1.15**	**HE**

Source: Field Survey, 2024.

Table 2 above revealed the extent to which data-driven insights through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis. Majority of the respondents agreed with all the items in the table except item 10 and 14. The grand mean scores of 2.91, 3.01 and standard deviation scores of 1.11 and 1.15 for students and teachers respectively indicate that data-driven insights through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis to a high extent. The answer to research question 2 therefore is that: students and teachers indicates that data-driven insights through AI implementation influence students' academic performance in public senior secondary schools to a high extent.

Research Question 3: To what extent does efficient administrative task through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis?

Table 3: Mean Ratings on the Extent Efficient Administrative Task through AI Implementation Influence Students' Academic Performance in Public Senior Secondary Schools in Port Harcourt Metropolis.

S/N	Questionnaire Items for Efficient Administrative Task	Students (394)			Teachers (333)		
		$\overline{X}$	SD	Decision	$\overline{X}$	SD	Decision

15.	AI helps students in Personalized Learning.	3.46	1.19	HE	3.43	1.14	HE
16.	Faster Feedback. Automated grading and feedback systems ensure that students receive timely responses on assignments and tests.	3.28	1.15	HE	3.37	1.17	HE
17.	AI helps ensure that students have access to the right materials, instructors, and learning environments at the right times.	3.41	1.08	HE	3.49	1.02	HE
18.	AI helps in improved Communication between students, teachers and parents.	3.40	1.14	HE	3.46	1.11	HE
19.	It helps to reduced administrative burden on teachers.	3.45	1.06	HE	3.48	1.19	HE
20.	AI analytics provide insights into student performance and learning patterns.	3.33	1.13	HE	3.29	1.03	HE
21.	AI-driven tutoring systems can provide individualized assistance outside the classroom, offering students additional practice and support tailored to their needs.	3.49	1.12	HE	3.47	1.08	HE
	Grand Scores	**3.40**	**1.12**	**HE**	**3.43**	**1.21**	**HE**

Source: Field Survey, 2024.

Table 3 above revealed the extent to which efficient administrative task through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis. Majority of the respondents agreed with all the items in the table. The grand mean scores of 3.40, 3.43 and standard deviation scores of 1.12 and 1.21 for students and teachers respectively indicate that efficient administrative task through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis to a high extent. The answer to research question 3 therefore is that: students and teachers indicate that efficient administrative task through AI implementation influence students' academic performance in public senior secondary schools to a high extent.

Test of Hypotheses

H_{o1}: There is no significant difference in the mean ratings of teachers and students on the extent to which improved access to resources through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis.

Table4: z-testAnalysisofDifferenceintheMeanRatingsofStudentsandTeachersonthe Extent to which Improved Access to Resources through AI Implementation Influence Students' Academic Performance in Public Senior Secondary Schools in Port Harcourt Metropolis.

Category of Respondents	N	X̄	SD	A	Df	z-cal	z-crit	Decision
Students	394	3.11	1.14					Ho
				0.05	725	0.24	±1.96	
Teachers	333	3.09	1.11					Accepted

Source: Field Survey, 2024.

From Table 4 above, the calculated z-value of 0.24 is less than the z-critical value of 1.96 at 725 degree of freedom and 0.05 alpha level. Given the above, the null hypothesis which states that there is no significant difference in the mean ratings of students and teachers on the extent to which improved access to resources through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis is hereby accepted. The implication of this is that students and teachers consented that improved access to resources through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis to a high extent. **H$_{o2}$:** There is no significant difference in the mean ratings of teachers and students on the extent to which data-driven insights through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis.

Table 5: z-test Analysis of Difference in the Mean Ratings ofStudentsand Teachers on the Extent Data-Driven Insights through AI Implementation Influence Students' Academic Performance in Public Senior Secondary Schools in Port Harcourt Metropolis.

Category of Respondents	N	X̄	SD	A	Df	z-cal	z-crit	Decision
Students	394	2.91	1.11					Ho
				0.05	725	-1.17	±1.96	
Teachers	333	3.01	1.15					Accepted

Source: Field Survey, 2024.

From Table 5 above, the calculated z-value of -1.17 is less than the z-critical value of 1.96 at 725 degree of freedom and 0.05 alpha level. Given the above, the null hypothesis which states that there is no significant difference in the mean ratings of students and teachers on the extent to which data-driven insights through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis is hereby accepted.

The implication of this is that students and teachers agreed that data-driven insights through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis to a high extent.

H₀3: There is no significant difference in the mean ratings of students and teachers on the extent to which efficient administrative task through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis.

Table 6: z-test Analysis of Difference in the Mean Ratings of Students and Teachers on the Extent Efficient Administrative task through AI Implementation Influence Students' Academic Performance in Public Senior Secondary Schools in Port Harcourt Metropolis.

Category of Respondents	N	$\bar{X}$	SD	A	Df	z-cal	z-crit	Decision
Students	394	3.40	1.12					Ho
				0.05	725	-0.34	±1.96	
Teachers	333	3.43	1.21					Accepted

Source: Field Survey, 2024.

From Table 6 above, the calculated z-value of -0.34 is less than the z-critical value of 1.96 at 725 degree of freedom and 0.05 alpha level. Given the above, the null hypothesis which states that there is no significant difference in the mean ratings of students and teachers on the extent to which efficient administrative task through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis is hereby accepted. The implication of this is that efficient administrative task through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis to a very high extent.

Discussion of Findings

Improved Access to Resources through AI and Students' Academic Performance

The result of the findings of the study for research question one revealed that improved access to resources through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis to a high extent. With grand mean scores of 3.11 and 3.09 which are greater than the criterion mean of 2.50. The corresponding hypothesis one also revealed that there is no significant difference in the mean ratings of students and teachers on the extent to which improved access to resources through AI implementation influence students' academic performance in public senior secondary schools

in Port Harcourt metropolis. This finding is in line with Huang, M.-H., and Rust, R. T. (2021), who viewed that AI can facilitate access to free or low-cost educational resources and courses, making education more affordable and accessible to a wider audience. The finding is also line with West (2023), who opined that, the integration of AI in the classroom is anticipated to bridge gaps in educational attainment by providing equitable access to resources and knowledge, assisting in reducing instructional disparities that are often found in public educational institutions.

Data-Driven Insights through AI and Students' Academic Performance

The findings of the study for research question two revealed that data-driven insights through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis to a very high extent. With grand mean scores of 2.91 and 3.01 which are greater than the criterion mean of 2.50. The corresponding hypothesis two also revealed that there is no significant difference in the mean ratings of students and teachers on the extent to which data-driven insights through AI implementation influence students' academic performance in public senior secondary schools. This finding is in line with the view of Williamson et al., (2022), who mentioned that data-driven Insights through AI can provide detailed and timely feedback to students, helping them understand their progress and areas for improvement.

Efficient Administrative Task through AI and Students' Academic Performance

The findings of the study for research question three revealed that efficient administrative task through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis to a high extent. With grand mean scores of 3.40 and 3.43 which are greater than the criterion means of 2.50. The corresponding hypothesis three revealed that there is no significant difference in the mean ratings of students and teachers on the extent to which efficient administrative task through AI implementation influence students' academic performance in public senior secondary schools in Port Harcourt metropolis. This finding is in line with the view of Lee, (2021) who mentioned that AI helps ensure that students have access to the right materials, instructors, and learning environments at the right times.

Conclusion

Based on the findings of the study, it was concluded that the perceived benefits of implementing Artificial intelligence technologies on students' academic performance in secondary schools in Port Harcourt Metropolis include improved access to resources through AI, data-driven insights

through AI and efficient administrative task through AI. The study further concluded that. The exploration of the perceived benefits of Artificial Intelligence (AI) technologies in public senior secondary schools within the Port Harcourt Metropolis underscores a significant advancement in educational methodologies. AI's integration into the educational landscape offers a powerful tool for improving academic performance, addressing both the individualized needs of students and broader systemic challenges faced by educators.AI technologies facilitate personalized learning experiences by adapting content to suit individual learning velocities and styles, thereby promoting greater engagement and understanding among students. These technologies can identify patterns of strengths and weaknesses in student learning, allowing for timely and targeted interventions.

Recommendations

Based on the findings of the study, it was recommended that:

1. Federal and State government, Ministry of education, Curriculum planners and principals should implement A.I technology in public schools to improve students' academic performance.

2. It is crucial to engage all stakeholders, including educators, students, parents, and administrators, in the process of AI implementation. Comprehensive training programs should be developed to equip teachers with the necessary skills to effectively integrate AI tools into the curriculum. For students, workshops and informational sessions can help demystify AI technologies and illustrate their benefits, reducing apprehension and resistance.

3. Adequate technological infrastructure must be established to support the integration of AI in schools. This includes ensuring reliable internet access, providing necessary hardware such as computers and tablets, and maintaining software platforms. Investment in infrastructure is fundamental to enable seamless and consistent use of AI technologies in educational settings.

4. Establish clear guidelines and policies regarding data privacy and the ethical use of AI in schools. Educators and administrators should work with legal experts to develop protocols that protect student data while maximizing the benefits of AI technologies. Transparency in data usage will help build trust among students and parents.

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Leadership Strategies to Artificial Intelligence-Driven Entrepreneurship Education: Challenges, Opportunities and Best Practices for Students Self-Reliance in Rivers State

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Abstract

The integration of Artificial Intelligence (AI) in entrepreneurship education holds transformative potential for fostering student self-reliance, particularly in higher institutions of Rivers State, Nigeria. As digital technologies evolve, educational leaders must adopt strategic approaches to harness AI-driven tools that can enhance entrepreneurship skills, promote innovation, and equip students with the necessary competencies to thrive in self-sufficient careers. This paper examines the challenges and opportunities in integrating AI into entrepreneurship education in Rivers State and proposes best practices for educational leaders to foster student self-reliance. Anchored in transformational leadership theory, the study emphasizes the need for visionary leadership to drive change and adapt to the demands of the digital economy, while addressing barriers such as infrastructure limitations, resistance to change, and inadequate expertise in AI applications. The implications of the research offer policy recommendations and curriculum development strategies to guide leaders in navigating the complexities of AI adoption in entrepreneurship education.

Keywords: Leadership Strategies, Artificial Intelligence, Entrepreneurship Education, Student Self-Reliance

Introduction

The rapid advancement of Artificial Intelligence (AI) has led to profound transformations across various sectors of the global economy, including education. In Nigeria, particularly in Rivers State, this digital revolution presents both opportunities and challenges in the realm of entrepreneurship education. Artificial Intelligence has the potential to enhance entrepreneurship education by providing students with new tools for innovation, problem-solving, and skill development, thereby fostering self-reliance. However, despite the growing significance of AI in education, there is a notable gap in the leadership strategies necessary for effectively integrating these technologies into the curriculum of higher institutions Rivers State

Artificial Intelligence (AI) has emerged as a revolutionary force in transforming education, especially in entrepreneurship, by offering innovative tools to support student self-reliance (Nwachukwu & Oboh, 2021). The growing global digital economy necessitates a strategic integration of AI in educational systems, particularly in Nigerian higher institutions, such as those in Rivers State. AI presents an unprecedented opportunity to enhance entrepreneurial education, offering personalized learning experiences, automated decision-making, and advanced data analysis (Bamidele, 2021). However, the integration of AI into entrepreneurship education faces several challenges that need strategic leadership to address, such as inadequate infrastructure, limited access to technological resources, limited expertise, resistance to technological change and a lack of expertise among educators in the application of AI in teaching and learning (Okorie & Omotayo, 2020)

Entrepreneurship education plays a critical role in empowering individuals to become self-sufficient, innovative, and capable of creating their own career opportunities rather than seeking employment. In Nigeria, where the unemployment rate is persistently high, nurturing a new generation of job creators is essential for national development. AI has the potential to revolutionize entrepreneurship education by providing personalized learning experiences, enabling real-time data analysis, and facilitating hands-on training in digital tools, all of which are critical in today's tech-driven world

In Rivers State, where entrepreneurship education is vital to equipping students with skills to thrive in a challenging economic environment, AI could provide valuable resources for developing student self-reliance. By equipping students with the necessary tools to innovate and adapt in a digital economy, AI has the potential to transform the way entrepreneurship is taught and practiced.

This study explores the challenges, opportunities, and best practices for leadership in implementing AI-driven entrepreneurship education that promotes student self-reliance in Rivers State. Anchored in transformational leadership theory, the study examines how visionary leadership can overcome these challenges, inspire innovation, and adapt educational practices to meet the demands of a rapidly changing digital economy.

Despite the growing recognition of the importance of AI in education, there is a significant gap in leadership strategies for AI-driven entrepreneurship education in Rivers State, Nigeria. According to Ogunyemi & Oyebanji (2022) the integration process faces numerous obstacles

that require the intervention of visionary leadership, in line with the transformational leadership framework. Educational leaders often struggle with several challenges in integrating AI into entrepreneurship curricula. These challenges include a lack of adequate infrastructure, resistance from staff and students towards technology adoption, insufficient expertise in AI applications, and inadequate funding for AI initiatives. As a result, the full potential of AI-driven entrepreneurship education remains untapped, and students in higher institutions continue to face barriers to achieving self-reliance in the digital economy

The Role of AI in Entrepreneurship Education

AI plays a pivotal role in reshaping entrepreneurship education by providing opportunities for students to engage with real-world business challenges and learn in innovative ways. It enables personalized learning, where algorithms adapt teaching content to the needs of individual students, thereby enhancing the quality of education (Salami, 2020). AI tools can simulate market conditions, allowing students to test business strategies, identify market gaps, and refine their ideas without incurring the risks associated with real-world experimentation (Nwachukwu & Oboh, 2021).

AI also facilitates a data-driven approach to entrepreneurship. By leveraging data analytics and machine learning, students can gain insights into consumer behavior, market trends, and competitive dynamics, thus improving their decision-making capabilities (Akanbi & Akinwale, 2020). This is particularly important in the context of Nigeria, where small businesses often lack access to sophisticated data analysis tools. With AI, students can be trained to think critically and strategically about their business ventures, thereby fostering self-reliance in the long term (Adefolaju & Adeyemo, 2020).

Furthermore, AI-powered virtual platforms provide an interactive space for students to engage in experiential learning. For example, AI-based simulations allow students to test business ideas, manage virtual companies, and explore the financial viability of new ventures (Olugbenga & Oseni, 2021). These opportunities prepare students for real-world challenges and offer them the chance to develop entrepreneurial skills in a dynamic, risk-free environment.

Challenges in Integrating AI into Entrepreneurship Education in Rivers State

Despite its promise, integrating AI into entrepreneurship education in Rivers State faces several challenges that hinder its effective implementation.

1. **Infrastructure and Technological Constraints**

   A major barrier to AI integration is the lack of adequate infrastructure in most educational institutions across Nigeria, including Rivers State. The poor state of internet connectivity, power outages, and outdated computing resources hinder the effective use of AI tools in entrepreneurship education (Adefolaju & Adeyemo, 2020). According to Nwachukwu and Oboh (2021), institutions in Rivers State struggle with the technological infrastructure required for AI applications, which limits students' access to advanced AI tools and resources.

2. **Resistance to Change**

   Another significant challenge in AI integration is resistance to change. Many educators and administrators in Rivers State remain unfamiliar with AI technologies, often resulting in reluctance to incorporate them into the curriculum (Salami, 2020).

   Staff members, especially those who have been teaching for years using traditional methods, may resist adopting new technologies due to concerns about additional workload and lack of training (Okorie & Omotayo, 2020). Similarly, students may find it difficult to adjust to AI-driven learning platforms, preferring the conventional face-to-face teaching methods (Olugbenga & Oseni, 2021).

3. **Inadequate Expertise and Training**

   Another challenge is the insufficient number of educators who are equipped with the necessary expertise to teach AI and its applications in entrepreneurship (Ogunyemi & Oyebanji, 2022). There is a noticeable gap in AI-related knowledge and professional development opportunities for staff members in Rivers State, which impedes the ability of institutions to fully integrate AI into their teaching practices (Bamidele, 2021). Without adequate training, staff members struggle to harness the potential of AI in fostering student self-reliance.

Opportunities for Enhancing Student Self-Reliance through AI

Despite these challenges, AI offers substantial opportunities to enhance student self-reliance in Rivers State by equipping students with the skills and tools to become independent entrepreneurs.

1. Innovation and Creativity

AI's ability to analyze large datasets and predict trends can foster innovation in entrepreneurship education by helping students generate creative ideas (Salami, 2020). AI can assist students in identifying market opportunities, testing product ideas, and developing business models that meet the needs of consumers. By using AI-powered platforms to experiment with different business strategies, students can refine their entrepreneurial ideas and gain a deeper understanding of market dynamics (Bamidele, 2021).

2. Improved Decision-Making

AI technologies, such as machine learning algorithms, can provide students with valuable insights into consumer behavior, financial markets, and competitor strategies (Akanbi & Akinwale, 2020). This enables students to make more informed, data-driven decisions when developing their business ventures. By teaching students to rely on data and analysis rather than intuition alone, AI can promote more confident and independent decision-making skills, essential for self-reliance in entrepreneurship (Olugbenga & Oseni, 2021).

3. Building Entrepreneurial Competence

AI offers opportunities for experiential learning, where students can engage in hands-on activities such as business simulations, financial modeling, and market analysis. This type of learning not only enhances entrepreneurial skills but also builds confidence in students' abilities to launch and manage businesses independently (Adefolaju & Adeyemo, 2020). The ability to learn through AI-powered tools equips students with the critical thinking and problem-solving skills needed to navigate the challenges of entrepreneurship.

Transformational Leadership in AI Integration

Transformational leadership is essential for driving the successful integration of AI into entrepreneurship education in Rivers State. Transformational leaders in education are visionaries who inspire faculty, students, and stakeholders to embrace new technologies and innovative approaches to teaching and learning (Bass & Riggio, 2019). These leaders are critical in guiding institutions through the complexities of AI integration.

1. Vision for AI in Education

A transformational leader must create and communicate a compelling vision of AI's potential to transform entrepreneurship education (Ogunyemi & Oyebanji, 2022). This vision should highlight how AI can enhance teaching and learning, improve student outcomes, and foster self-

reliance among students. By setting a clear direction and emphasizing the benefits of AI, transformational leaders can motivate stakeholders to embrace technological change.

2. Professional Development for Educators

For AI integration to succeed, transformational leaders must ensure that educators receive the necessary training to implement AI effectively (Nwachukwu & Oboh, 2021). Leaders should prioritize continuous professional development through workshops, certifications, and partnerships with AI experts, which will empower faculty members to use AI tools in their teaching (Okorie & Omotayo, 2020).

3. Fostering Collaboration

Transformational leadership also encourages collaboration between academic institutions, AI companies, and other stakeholders. By fostering partnerships with technology companies and industry experts, educational leaders can provide students with access to AI tools and real-world entrepreneurial experiences (Salami, 2020). This collaboration strengthens the practical applications of AI in entrepreneurship education.

Best Practices for Integrating AI into Entrepreneurship Education

To ensure the successful integration of AI, the following best practices should be adopted:

1. AI-Enhanced Curriculum Development

An AI-integrated curriculum should be developed to reflect the evolving nature of entrepreneurship and the digital economy. This curriculum should combine AI tools with traditional business concepts, allowing students to acquire both theoretical and practical knowledge (Bamidele, 2021). Such a curriculum should include AI-driven simulations, data analysis modules, and digital business strategies.

2. Technological Investment

Higher education institutions in Rivers State must invest in the necessary infrastructure to support AI integration, including reliable internet access, high-performance computers, and AI software tools (Akanbi & Akinwale, 2020). Without adequate technological resources, AI tools cannot be fully utilized, thus limiting the effectiveness of entrepreneurship education.

3. Encouraging Active, Experiential Learning

AI integration should focus on active learning methodologies, including project-based learning, entrepreneurship competitions, and industry internships, where students can apply AI tools to

solve real-world problems (Olugbenga & Oseni, 2021). This hands-on approach will foster self-reliance and innovative thinking among students.

The paper suggests that;

1. The Nigerian government should implement policies that promote AI literacy from the primary and secondary school levels, through to higher education. This can be achieved by revising national educational curricula to include AI-focused subjects, coding, and data science, starting from early education. Furthermore, specialized AI training programs for teachers at all levels should be introduced to build a solid foundation for students, ensuring that they are prepared for the complexities of the digital economy. By embedding AI education from an early stage, Nigeria can create a more technologically adept workforce, well-prepared to utilize AI in entrepreneurship ventures.

2. The Nigerian government should allocate funding and resources to support the integration of AI in education, particularly in Rivers State. This could include grants for AI research, funding for AI infrastructure, and the development of AI curricula tailored to entrepreneurship (Salami, 2020).

3. Public-private partnerships are crucial for fostering AI innovation in entrepreneurship education. Nigerian educational institutions should collaborate with AI companies to provide students with exposure to cutting-edge technologies and entrepreneurial opportunities (Okorie & Omotayo, 2020).

Conclusion

The integration of AI into entrepreneurship education in Rivers State presents both significant challenges and exciting opportunities. With proper leadership, investment in infrastructure, and a commitment to professional development, AI can revolutionize entrepreneurship education, fostering greater self-reliance among students. By addressing these challenges and adopting best practices, educational leaders in Rivers State can prepare students for success in an increasingly digital and AI-driven economy.

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Revitalizing Secondary Education for Sustainable Development and Economic Growth in Nigeria

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Abstract

Education remains a vital tool for promoting social change and stimulating economic development within a country. This study examines the importance of revitalizing secondary education in Nigeria as a key factor in achieving sustainable development and economic growth. Secondary data were used to support the points raised in the article. The data were sourced from print materials and online publications by different authors. This article explores the implications of revitalizing secondary education in Nigeria for sustainable development and economic growth. It examines the current state of secondary education, identifies key challenges, and proposes strategic interventions to enhance the quality of education. The current state of secondary education in Nigeria faces significant challenges which are inadequate facilities, limited financial resources, insufficient teacher training, and outdated curricula, leading to poor academic outcomes and high dropout rates. The study recommends comprehensive reforms in educational management, teacher training, curriculum improvements, provision of security and infrastructure upgrades. The study concludes that revitalizing secondary education is imperative for Nigeria's sustainable development and economic progress, providing a roadmap for government, stakeholders to enable invest in education so as to promote innovation and creativity among students. These efforts will help to the prepare students for the challenges and opportunities of the 21st century and empower them to drive economic growth and innovation in the country.

Keywords: Revitalization, Secondary Education, Sustainable Development, Economic Growth, Nigeria.

Introduction

Revitalization of education means efforts and initiatives aimed at renewing, improving and transforming educational systems to make them more relevant, effective and accessible. The progress of any society is tied to the quality of education it offers. This quality depends on the effectiveness of teachers, the involvement of students, and the active engagement of parents in the educational process (Paschal and Mkulu, 2020). One of the main purposes of teaching and learning is to promote professional growth and academic success among students, which can, in turn, lead to broader social and economic progress (Paschal and Mkulu, 2020). Education has been a crucial foundation for national economic development, encompassing various skills,

competencies, and attributes that boost productivity (World Economic Forum, 2016). The importance of secondary education in Nigeria cannot be overstated, as it serves as a foundational element in the broader educational landscape. This stage of education is vital for equipping young individuals with the necessary skills and knowledge to contribute effectively to the economy and society. To realize the aspirations outlined in Vision 2020 and to align with the global Sustainable Development Goals, it is crucial to invest in and improve the standards of secondary education across the country.

According to Olorunda (2022), revitalization of secondary education refers to efforts aimed at renewing, improving, and modernizing secondary education systems to make them more effective, relevant, and capable of meeting the current and future needs of students and society. This process often involves comprehensive reforms in curriculum, teaching methods, infrastructure, governance, and policy frameworks. The goal is to ensure that secondary education not only provides academic knowledge but also equips students with the skills, values, and competencies necessary to thrive in a rapidly changing world.

Revitalizing secondary education involves addressing challenges such as inadequate infrastructure, insecurity, S insufficient funding, and a lack of qualified teachers. According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), improving the quality of education is essential for promoting economic growth and reducing poverty (UNESCO, 2021). The World Bank (2018) highlights that secondary education is a key driver of economic development, noting that countries with higher levels of secondary education attainment experience faster economic growth.

In Nigeria, secondary education has faced numerous obstacles, including overcrowded classrooms, outdated curricula, and limited access to educational resources. These issues have hindered the ability of the educational system to produce graduates who are equipped with the necessary skills and knowledge to thrive in a competitive global economy. Revitalizing secondary education requires a multifaceted approach that includes policy reforms, increased investment in education, and the adoption of innovative teaching methodologies.

The role of educational administrators in this revitalization process cannot be overstated. Effective leadership and management are crucial for implementing changes that will enhance the quality of education. As noted by Adedeji and Olaniyan (2011), strong educational leadership is associated with improved school performance and student outcomes. Educational

administrators must be empowered with the skills and resources needed to lead this transformation.

Education

Education thus, succinctly put in the National policy on education (2014), is the greatest force that can be used to bring out redress as well the greatest investment that the nation can make for the quick development of its economic, political, social, and human resources. It also connotes the process of helping an individual learn and develop intellectual faculty to the full though the acquisition of skills needed to make him/he useful to humanity in general. This is done by transmitting knowledge through teaching, training, conditioning, indoctrination, and drilling. Ariguzo and Nwaneri (2018) noted that education is the fulcrum for the realization, full promotion, and improvement of a nation. It empowers people to harness their potentials and fulfill their roles as members of the society. Obunadike (2013) opined that education is the transmission of what is desirable to individuals to make them knowledgeable and contributing members of the society. Asaju and Sunday (2014) posited that education is a process of teaching and training in schools for the development of knowledge and skills, preparing the individual for functional living in the society. Okojie (2013) assert that education is a process for manpower development which is necessary for the achievement of rapid growth and development in any country. Ofojebe (2014) emphasized that at any given time, education is important for any country's socio-economic, cultural, and political development. Education includes equipping human resources with the rightful skills, understanding, qualities and competences that will enable them to participate effectively in the development of their environment for wholesome development. Ofogbor and Emekedou (2017) quoted UNESCO's definition of education as the total process of developing human ability and behaviour. They maintained that education is an organized and sustained instruction designed to communicate a combination of knowledge, skill and understanding values for all activities of life. Todaro and Smith (2019), Education can be conceived as the development of the cognitive, affective and psychomotor domains and the abilities of an individual for optimal function and performance in the society. The individual has to be helped to develop his mental, emotional and psychological abilities that will be a benefit to him and the society in which he lives. Education enhances the quality of an individual and enables him to build up his personality in such a way that he is able to play an effective role in the development of the society in which he lives (Okeke, 2018).

Secondary Education

Secondary education is a critical phase that prepares students for higher education, vocational training, and the labor market. It provides a broad curriculum that includes core subjects such as mathematics, sciences, languages, and social studies, as well as technical and vocational subjects that enhance employability skills. According to the Nigerian National Policy on Education, the objectives of secondary education include preparing individuals for useful living within society and higher education (Federal Ministry of Education, 2013). Secondary education is a crucial period in a child's learning journey during which a learner's character, career, aspirations and readiness to take on responsibilities are shaped. Hence quality secondary education is vital for creating a bright future for individual and the nation. Secondary Education is the foundational education that is available to everyone within the stipulated age limits, and also not restricted to any particular gender, place and time and upon which all other educational strata rests. Secondary education is a type of schooling which comprises six years in the primary school and three years of junior secondary and three years of senior secondary level of education. According to the National Policy on Education (2016) secondary education shall be free and compulsory. It shall include adult and non – formal education program at primary, junior and senior secondary and out of school children.

Sustainable Development

Sustainable national development is a complex concept comprising two key components: sustainable development and national development. According to (Abraham, 2012), "Sustainable" refers to the ability to maintain performance over time, ensuring the long-term viability of programs and initiatives. Brundtland Commission Report (1987), describes sustainable development as a form of growth that meets the needs of the present without compromising the ability of future generations to meet their own needs This agrees with Oyeshola (2012) posited that sustainable development is a form of development perspectives, which integrates production process with resources conservation and environmental enhancement to tackle the need of the present without compromising the ability of future generation to meet their own needs.

According to Nayar (2013), sustainable development is defined by its continuous and evolving nature, aiming to leverage the advantages of positive economic, social, and ecological changes to meet the essential needs of both present and future generations. This strategy highlights the necessity of balancing growth with resource conservation to ensure that everyone can prosper.

The Rio Declaration on Environment and Development (2012) describes sustainable development as a framework that allows for current progress without undermining the developmental needs of both current and future populations. This principle emphasizes the importance of improving the quality of life for all individuals while ensuring that the well-being of future generations is not compromised. Aliwa (2016) submitted that sustainable development as lasting socio-economic, political technological advancement capable of bringing qualitative education, gainful employment, maximum security, free, fair, credible transparent elections, provision of social amenities, good governance, rule of law, and respect for gender equality. Onyido and Odum (2014) were of the view that sustainable development implies a new concept of economic growth, one that provides fairness and opportunities for the entire world finite natural resources. To them sustainable implies improvement in the quality of human lives that meets the needs of the present generation without compromising the needs of future generations. Akintoye and Opeyemi (2014) rightly put it that sustainable development is a process of responding to global environmental issues in terms of equity, fairness, biophysical and equal distribution.

The progress of a nation can be classified as either sustainable or unsustainable, as noted by Ajibola and Okafor (2017). Unsustainable development is evident in societies marked by significant poverty levels, food insecurity, inadequate healthcare services, gender disparities, poor sanitation practices, inefficient energy utilization, lack of water conservation efforts, insufficient infrastructure, heightened environmental pollution, human rights violations, injustice, and a high prevalence of both unemployable and unemployed graduates. Additionally, issues such as climate change and environmental degradation further exacerbate the unsustainable nature of development. The pursuit of sustainable development in Nigeria necessitates a collaborative effort among various stakeholders, including school administrators, government entities at all levels, and citizens from diverse backgrounds. It is imperative that individuals, regardless of their religion, age, gender, educational qualifications, or social status, actively participate in this collective endeavor. Only through unified action and commitment can Nigeria hope to overcome its developmental challenges and achieve a sustainable future for all its citizens.

Sustainable Development Goals (SDGs)

Sustainable development is encapsulated in a framework of 17 goals that nations are urged to accomplish by the year 2030. It serves as guide for achieving sustainable development globally.

These goals, known as the Sustainable Development Goals (SDGs), encompass a wide range of social, economic, and environmental objectives aimed at fostering a more equitable and sustainable world. The goals also address issues such as poverty, hunger, health, education, gender equality, clean water, and climate action (United Nations, 2015). Sustainable Development Goals are: No poverty, Zero Hunger, Good Health and Well-being, Quality Education. Gender Equality, Clean Water, Sanitation, Affordable and Clean Energy, Decent Work and Economic Growth, Industry, Innovation, and Infrastructure, Reduced Inequality. Sustainable Cities and Communities, Responsible Consumption and Production, Climate Action. Life Below Water, Life on Land, Peace and Justice Strong Institutions (United Nations, 2015). In Nigeria, the way to realize these goals begins with engaging the populace in the vision of these goals. This process necessitates effective reforms in the educational curriculum and the implementation of relevant policies, supported by appropriate tools and machinery, alongside the active involvement of all citizens (Ajibola & Okafor, 2017). For Nigeria to make significant strides towards the sustainable development goals, it is imperative to focus on the development and empowerment of its citizens through education.

Secondary Education for Sustainable Development

Education for sustainable development allows every human being to acquire knowledge, skills, attitudes and values necessary to shape a sustainable future. Secondary education plays a fundamental role in fostering sustainable development by equipping students with the knowledge, skills, and competencies necessary to address contemporary global challenges, According to Tilak (2019), secondary education prepare students to engage in higher-order thinking, problem-solving, and innovation, which are essential for sustainable development. According to United Nation (2015), secondary education contributes to the formation of a skilled workforce that can drive economic progress and support the achievement of the Sustainable Development Goals (SDGs).

How to Revitalize Secondary Education to Achieve Sustainable Development and Economic Growth in Nigeria

Policy Reforms

Policy reforms are essential for creating an enabling environment for the improvement of secondary education in Nigeria. The government should prioritize education in its national development agenda and allocate sufficient resources to the education sector (World Bank, 2018). Additionally, policies that promote equity, addressing gender disparities and supporting

marginalized communities, should be implemented to ensure that all students have access to quality education (UNICEF, 2020).

Curriculum Reform

The curriculum should be updated to include education on sustainable development, focusing on environmental stewardship, social equity, and economic growth. Subjects like environmental science, renewable energy, and sustainable agriculture can be introduced (UNESCO, 2017);

Increased Investment in Education

Increased investment in education is crucial for improving the quality of secondary education in Nigeria. This investment should be directed towards building and renovating school infrastructure, providing learning materials, and supporting teacher training and professional development (Obanya, 2010). Public-private partnerships can also play a significant role in mobilizing resources for education and enhancing the quality of education provision (Adedeji, 2011).

Adoption of Innovative Teaching Methodologies

The adoption of innovative teaching methodologies is essential for enhancing the effectiveness of secondary education in Nigeria. This includes the use of technology in education, such as e-learning platforms and digital resources, to support teaching and learning (Ogunyemi, 2011). Additionally, learner-centered pedagogies that promote critical thinking, creativity, and problem-solving skills should be encouraged (Aina, 2017).

The Role of Educational Administrators

Educational administrators play a crucial role in the revitalization of secondary education in Nigeria. Effective leadership and management are essential for implementing the necessary changes and ensuring that schools provide quality education (Adedeji & Olaniyan, 2011). Educational administrators should be empowered with the skills and resources needed to lead this transformation, including training in educational leadership and management (Obanya, 2010).

Challenges Facing Secondary Education in Nigeria

The following are some of the challenges faced while trying to revitalize secondary education for sustainable development and economic growth in Nigeria:

Inadequate Infrastructure and Funding

One of the major obstacles to effective secondary education in Nigeria is the inadequate infrastructure and funding. Many schools lack basic facilities such as classrooms, laboratories, and libraries, which are essential for providing quality education (Obanya, 2010). The Nigerian government's expenditure on education has consistently been below the recommended benchmark of 26% of the national budget as suggested by UNESCO (UNESCO, 2015). This underfunding has resulted in a decline in the quality of education and has hindered efforts to improve school infrastructure and resources.

Teacher Shortage and Professional Development

The shortage of qualified teachers is another significant challenge facing secondary education in Nigeria. According to Akinyemi (2014), there is a high pupil-teacher ratio in many secondary schools, which affects the quality of teaching and learning. Furthermore, many teachers lack access to professional development opportunities that would enable them to improve their teaching skills and stay updated with current educational practices (Ogunyemi, 2011). The need for continuous professional development for teachers is critical in ensuring that they are well-equipped to deliver effective instruction and support student learning.

Insecurity and Conflict

Insecurity, particularly in the northern regions of Nigeria, poses a significant challenge to the revitalization of secondary education. Boko Haram's attacks on schools, kidnappings, and general instability have led to the closure of many schools and created a climate of fear that discourages attendance. Insecurity and the ongoing conflicts have displaced large numbers of students and teachers, disrupting education and creating additional barriers to access and quality. (Shehu, 2020).

Outdated Curricula

The curricula used in many Nigerian secondary schools are outdated and do not adequately prepare students for the demands of the modern economy and society (Aina, 2017). There is a need for curriculum reform to ensure that it is aligned with the skills and competencies required for sustainable development. The incorporation of vocational and technical education, as well as a focus on science, technology, engineering, and mathematics (STEM), is essential for preparing students for future challenges (Federal Ministry of Education, 2013).

Conclusion

In conclusion, revitalizing secondary education in Nigeria is not merely a policy initiative but a transformative process that requires a commitment to continuous improvement and innovation. Secondary education in Nigeria plays a crucial role in developing the skills and competencies necessary for sustainable development in the 21st century. Secondary education is an important phase that prepares students for higher education, vocational training, and the labor market. It has shown that for secondary education in Nigeria to be revitalized to achieve sustainable development and economic growth in the country, there need to be provision of infrastructural facilities, funding, policy reform, increased investment in education, adoption of innovative teaching methodologies, entrepreneurship education, e-learning, provision of adequate facilities and much more. The challenges facing the implementation of the revitalization of secondary education for sustainable development and economic growth in Nigeria were discussed. As a way forward, it has suggested some strategies towards the revitalization of secondary education for sustainable development and economic growth in Nigeria,

Recommendations

Based on the issues discussed, the following recommendations are made as a way forward:

1. Adequate planning and effective implementation is essential for achieving broader educational goals. It serves as the foundation for successful educational initiatives. Therefore, adequate planning is the most effective managerial tool to be adopted in ensuring the maximum co-operation of school personnel to accomplish the educational objective thereby promoting sustainable development and economic growth.

2. Ensuring Sufficient Teaching and Learning Resources: The challenges in education can only be effectively addressed if the nation embraces its own solutions to its emerging issues. It is also recommended that an agency be established in each senatorial zone of the Federation to produce high-quality and affordable educational materials, as well as to provide training for teachers in the development of improvised instructional resources.

3. Strengthen Security Protocols in All Secondary Schools: To effectively tackle insecurity, it is crucial to create an environment that promotes sustainable development. This can be accomplished through government policies that require the installation of perimeter fencing around all schools, along with one or two designated entry and exit

points. Furthermore, it is vital to hire and deploy additional trained security personnel at each school to ensure the safety of both staff and property.

4. Implement Smaller Class Sizes : It is crucial for both government bodies and private school administrators to recruit more qualified teachers and improve or expand existing facilities to support the increasing number of students in secondary education. Additionally, it is vital for school inspectors to regularly assess secondary institutions to ensure that class sizes remain manageable. This strategy enables teachers to offer individualized attention to students, which is a more effective method for promoting strong academic achievement. The teacher-student ratio of 1:40, as outlined in the National Policy on Education (2014), must be strictly upheld in both public and private secondary schools.

5. Regular supervision, monitoring and evaluation of policies, programs, and activities of teachers and students are essential to enhance innovative ideas and promote sustainable development.

6. Strengthen Financial Support for Secondary Education: The government, stakeholders and individuals must work together to fund education and implement effective management strategies for timely and responsible resource allocation. Serious action should be taken against embezzlement or misappropriation of funds to deter corruption.

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Triple Helix Partnership in Educational Administration and Planning in Tertiary Institutions in Nigeria

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Abstract

The Triple Helix Partnership in Educational Administration and Planning in Tertiary Institutions is a collaborative model that brings together government, industry, and academia to address the challenges facing higher education. Its aims are to promote innovation, enhance efficiency, and improve the quality of education. The government plays a crucial role in the Triple Helix Partnership by providing regulatory frameworks, funding, and policy direction. Industry partners contribute their expertise, resources, and networks to support the development of new technologies, research, and innovation, while academia, through its research institutions and universities, provides knowledge generation, critical thinking, and problem-solving capabilities to drive the Triple Helix Partnership objectives. One of the key benefits of the Helix Partnership is its ability to foster collaboration and knowledge sharing among stakeholders. By working together, there is a complementary strength to address complex problems and develop innovative solutions. This collaborative approach helps to improve the quality of education, enhance student outcomes, and make tertiary institutions more competitive on the global stage. Additionally, the Triple Helix Partnership focuses on promoting entrepreneurship and innovation in tertiary education. By providing access to funding, mentorship, and industry networks, partnership helps to nurture a culture of innovation and support the development of new products, services, and technologies. This also helps to drive economic growth, create jobs, and enhance the competitiveness of the Nigerian higher education sector. By fostering collaboration, promoting innovation, and leveraging the strengths of government, industry, and academia, this partnership has the potential to change and assist tertiary institutions thrive in an increasingly competitive global landscape.

Keywords: Triple helix partnership, Educational administration, Educational Planning, Tertiary Institutions.

Introduction

The triple helix model refers to the collaboration between university, industry, and government to foster innovation and economic development. This model can also be applied to the field of educational administration and planning. The Triple Helix Partnership in Educational Administration and Planning is a collaborative model that brings together educational institutions, government agencies, and the private sector to improve educational outcomes. This partnership aims to leverage the unique strengths and resources of each stakeholder to address complex educational challenges.

The triple helix model blurs boundaries between the three sectors. For example, universities may take on more entrepreneurial and commercial activities, while industries invest in R&D and partner with academia. Governments facilitate these interactions through policies, regulations, and funding programs (Lopes, Farinha, Ferreira, & Silveira, 2021).

In the context of educational administration and planning, the triple helix can manifest in Joint research projects between universities, industry, and government agencies such as University-industry partnerships to develop curriculum and training programs aligned with workforce needs, Government funding and incentives to support university-industry collaboration and establishment of technology transfer offices, science parks, and other intermediary organizations as well as faculty entrepreneurship and the creation of spin-off companies from university research .The goal is to create an ecosystem where the exchange of knowledge, resources, and expertise between the three sectors leads to innovative educational programs, technologies, and solutions that benefit students, employers, and society as a whole.

Evolution of Helix Triple Partnership in the Tertiary Institutions

The origins of the Triple Helix model can be traced back to early theories of innovation and economic development that emphasized the role of knowledge and technological advancement. Notably, economists such as Joseph Schumpeter highlighted the importance of innovation in economic growth.

The formalization of the Triple Helix model occurred in the 1990s, primarily through the work of Henry Etzkowitz (2018) and Leydesdorff (2018). They proposed that a dynamic interaction between universities, industries, and governments could drive innovation and economic development. The evolution of the Helix Triple Partnership demonstrates the increasing complexity and integration of innovation systems. It highlights the importance of collaborative efforts among academia, industry, and government in driving technological advancements and addressing global challenges (Pique & Etzkowitz, 2018).

The goal is to create an ecosystem where the exchange of knowledge, resources, and expertise between the three sectors leads to innovative educational programs, technologies, and solutions that benefit students, employers, and society as a whole.

Rise of Intermediary Organizations: The triple helix has evolved to include new intermediary organizations such as accelerator programs, technology transfer offices, and science parks that facilitate collaboration between the three sectors ((Pique etal, 2018).

Increased Industry Engagement: There has been an earlier and more active involvement of industry partners in collaborating with universities, such as through joint research projects, curriculum development, and providing internships/employment.

Geographical Expansion: The triple helix ecosystem has expanded geographically, with hubs like Silicon Valley now encompassing both universities and industries in nearby cities like San Francisco.

Greater University Commercialization: Universities have taken on more entrepreneurial and commercial activities, including investing in capital funds and supporting the creation of spin-off companies from research.

Evolving Roles and Boundaries: The traditional boundaries between the three sectors have become more blurred, with each taking on roles traditionally associated with the others, such as universities engaging in production and industry contributing to knowledge creation

Triple Helix Models

The triple helix model involves collaboration among universities, industry, and government to foster innovation and economic development. The key components and stakeholders involved in this model:

Roles of Universities in Triple Helix Partnership in Educational Administration and Planning

Universities play a crucial role in the triple helix partnership in educational administration and planning. Here are the key roles and responsibilities of universities in this partnership:

Universities collaborate with industries to provide students with real-life cases and problems, enhancing their practical skills and preparing them for the workforce. This collaboration helps in commercializing research results and developing innovative solutions that meet industry needs (Hailu, 2024).

Universities generate new knowledge and ideas through research, which is essential for driving innovation and economic development. They engage in entrepreneurial activities, investing in capital funds and supporting the creation of spin-off companies from research.

There is institutional evolution called Triple Helix model that has led to the evolution of hybrid institutions where the characteristics of universities, industries, and governments overlap. This evolution is driven by increased interactions within the framework.

Universities educate and train the future workforce, ensuring that graduates possess the necessary skills to contribute to the knowledge economy. They develop curriculum and training programs aligned with workforce needs, integrating practical experience through work-integrated learning and problem-based learning (Azley & Mohammed, 2007).

Universities engage with communities through various initiatives, such as community engagement projects and work-integrated learning, to address social and learner support needs. These initiatives help in developing adaptable teachers and professionals who can function effectively in a rapidly changing world.

Universities influence policy through their research and advocacy, ensuring that education contributes to the well-being of society and the economy. They work with government agencies to set policies and create an enabling environment for university-industry collaboration.

Universities often act as intermediaries, facilitating communication and collaboration between industry and government, and providing resources and expertise to support these interactions

Industry partners provide practical, real-world knowledge and help commercialize new technologies and innovations developed at universities. They also offer internships, funding, and employment opportunities for students. Industry involvement is essential for bridging the gap between academia and the real world.

Government: Government agencies set policies, provide funding, and create an enabling environment for university-industry collaboration. They also help coordinate strategic initiatives between the three sectors. Governments ensure that education contributes to the well-being of society and the economy by supporting innovation and entrepreneurship.

Roles of industry in Triple Helix Partnership in Educational Administration and Planning

The industries provide funding and resource provision for research projects, scholarships, infrastructure development, and educational programs. In other words, it offers access to cutting-edge technology, equipment, and facilities that may not be readily available in educational institutions.

Industries help in shaping curriculum to ensure it is relevant to current market demands, integrating practical skills, and preparing students for the workforce. Industry experts can contribute by giving guest lectures, conducting workshops, and sharing insights on emerging trends and technologies (Benner & Sandström, 2023).

Industries provide internships, apprenticeships, and co-op programs that give students hands-on experience in their field of study. It thus facilitates smooth transitions from education to employment through structured career pathways and mentorship programs. The collaboration with universities on research and development projects that address real-world and challenges is an avenue to drive innovation. For instance, participation of industries becomes a veritable measure to facilitate transfer of knowledge and technology from academic research to practical industry applications.

Identifying and nurturing potential talent early through university-industry partnerships, ensuring a steady pipeline of skilled graduates. Thus, implementing training and development programs that enhance the skills of students and faculty, aligning them with industry standards become vital and essential. Advisory and Governance Roles by the industries provide strategic guidance on educational policies, program development, and institutional planning. In short, engaging in policy advocacy to influence government policies related to education, research funding, and innovation enhance the possibility of tertiary institution to balance the curriculum content.

Establishing incubators and accelerators within universities supports student and faculty start-ups and entrepreneurial ventures (Ranga, & Etzkowitz, 2021). This is done by providing funding, mentorship, and networking opportunities to promote entrepreneurship and innovation among students and researchers. There is a Corporate Social Responsibility (CSR) by engaging in initiatives that support educational programs, community development, and societal well-being. Thus, collaborating with educational institutions to address global challenges and contribute to achieving the United Nations Sustainable Development Goals (SDGs)

Roles of government in Triple Helix Partnership in Educational Administration and Planning

In the Triple Helix Partnership model, the government plays a crucial role in fostering collaboration between universities and industry. Its roles in educational administration and planning include:

Formulating policies that support the integration of education, research, and industry needs. In this case there is a formation of regulatory frameworks that facilitate collaboration among universities, industry, and other stakeholders (Göransson, & Brundenius, 2021).

The government thus providing grants and funding for research projects that involve university-industry collaboration. Investing in educational infrastructure, including facilities, laboratories, and technology needed for advanced research and innovation is paramount.

Offering tax breaks and incentives for industries that invest in university research and development projects. Programs and competitions are initiated that encourage universities and industries to collaborate on innovative solutions.

Facilitating networking and partnerships that establishing innovation hubs, research parks, and science cities where universities and industries can collaborate closely. In this situation, Conferences and Workshops that bring together academics, industry professionals, and policymakers to discuss and develop collaborative projects.

Quality Assurance and Accreditation Standards are initiated to ensure they meet industry and societal needs. Conducting regular audits and assessments of educational institutions to ensure compliance with established standards becomes the utmost objectives of the government (Carayannis, Campbell, & Rehman, 2024).

Skill Development Programs: Creating and funding programs that develop the skills needed by the industry, ensuring a well-prepared workforce. Therefore, promoting lifelong learning and continuous education to keep the workforce updated with the latest industry developments.

Developing a national research agenda that aligns with industry needs and societal goals helps in maintaining university relevance. By this grants and funding are provided for projects that drive innovation and address critical societal challenges (Benner & Sandström, 2023).

Facilitating and supporting public-private partnerships that drive innovation and economic development. Promoting the sharing of resources, including knowledge, technology, and infrastructure, between public institutions and private entities assist in the development of the tertiary institutions.

The government implementing policies and programs to ensure equitable access to quality education for all segments of the population. It therefore financial aid providing scholarships, grants, and financial aid to students from disadvantaged backgrounds. Collaboration, Benchmarking and Global Partnerships encourages and facilitates international collaborations in education and research. Using international benchmarks to set and maintain high standards in research and teaching reinforce the values of the tertiary institutions

Strategies for Effective Triple Helix Partnerships in the tertiary institutions in Nigeria

The Triple Helix model of innovation, which involves collaboration among universities, industry, and government, can significantly enhance the development and impact of higher education institutions in Nigeria. Strategies for effective Triple Helix partnerships in Nigerian universities reflect on:

Establish Clear and common goals through collaboratively define clear, achievable objectives that align with national development plans. It requires setting measurable outcomes, benchmarks and performance indicators to assess the progress and impact of the partnerships.

Foster Open Communication Channels and Schedule regular meetings and workshops among stakeholders to ensure continuous dialogue and feedback. This can result to promotion of transparency in decision-making processes and share information openly among partners.

Develop Structured Frameworks, Policies and formal agreements processes to create Memoranda of Understanding (MOUs) and other formal agreements to outline roles, responsibilities, and expectations. This is to develop policy support system to facilitate collaboration.

Enhance Capacity Building programs for university staff, industry professionals, and government officials to improve collaboration skills. Thus, workshops and seminars on best practices and successful case studies of Triple Helix partnerships.

Promote Interdisciplinary Research and Innovation that focus on key national and regional challenges. In this case, joint projects that encourage collaborative research projects that involve faculty, industry experts, and government representatives must be evolved.

Facilitate Knowledge Transfer and Commercialization within universities to manage intellectual property and facilitate the commercialization of research outcomes. This involves developing business incubators and accelerators to support start-ups and spin-off companies originating from university research.

Trends in Triple Helix Partnerships

Triple Helix partnerships are a collaborative model between academia, industry, and government. These partnerships aim to foster innovation, drive economic growth, and improve efficiency by bringing together the unique strengths and resources of each sector. Artificial intelligence (AI), big data, and digitalization are rapidly advancing technologies that have the potential to transform various industries. By integrating these technologies into Triple Helix partnerships, academia, industry, and government can collaborate to develop and implement innovative solutions.

For credible initiation of this model artificial intelligent is used to develop predictive models, automate processes, and improve decision-making. Big data analytics can provide valuable insights, improve efficiency, and drive competitiveness. Digitalization can enable businesses to adapt to the digital age, improving their operations and customer experience (Isaac, 2022). By working together, these three sectors can leverage their combined expertise and resources to drive innovation and create new opportunities. This collaboration can lead to the development of new products and services, improved processes, and more sustainable and efficient solutions.

In the case of smart cities, for instance, Triple Helix partnerships can bring together academia, industry, and government to develop and implement solutions such as smart transportation systems, energy-efficient buildings, and waste management systems. These partnerships can also facilitate collaboration on cybersecurity solutions to protect sensitive data and foster trust in digital technologies.

Triple Helix partnerships will facilitate the establishment of global innovation networks, connecting academia, industry, and government from different countries. These networks will enable collaboration on research, development, and implementation of innovative solutions, fostering knowledge sharing and driving economic growth. Cross-border R&D: As globalization advances, academia, industry, and government will collaborate on cross-border research and development (R&D) projects. This collaboration will enable the sharing of resources, expertise, and knowledge, leading to more innovative and sustainable solutions.

Triple Helix partnerships have become the trend to accelerate productive results in academia, industry, and government, international partnerships that fostering collaboration and knowledge sharing (William,2008). These partnerships facilitate the exchange of best practices, technologies, and ideas, driving innovation and fostering economic growth. As the world becomes more interconnected, there will be a growing demand for global talent pools. Triple Helix partnerships will enable academia, industry, and government to collaborate on attracting and retaining top talent from around the world. Cross-border educational initiatives hold immense potential to strengthen the Triple Helix model for future innovation and tackle global challenges. It thus boosts innovation through global knowledge pool, multicultural talent, hybrid education and intercultural fluency as well as policy harmonization.

Global innovation ecosystems are increasingly recognized as vital frameworks for fostering collaboration among various stakeholders, including businesses, academia, and government entities. These ecosystems are characterized by their dynamic interactions and the integration of diverse resources, which facilitate innovation and entrepreneurship. The concept of Triple Helix partnerships—where universities, industries, and governments collaborate—plays a crucial role in shaping these ecosystems (Honcharenko,2024).

Emerging Trends in Triple Helix Model in Tertiary Institutions in Nigeria

Emerging trends in the Triple Helix model within tertiary institutions in Nigeria indicate a significant shift towards enhanced collaboration among universities, industries, and government. This model emphasizes the importance of interactive relationships in driving innovation and economic development. Emerging trends shaping the application and effectiveness of this model reflect on:

There is policy and demand for increased University-Industry collaboration with emphasis on Research and Development (R&D) Partnerships**.** Tertiary institutions are increasingly partnering with industries for joint research projects. More so, there is partnership interest in internships and industrial training that emphasis integrating practical industry experience into academic curricula through internships and industrial training programs. The collaborations aim to address local challenges and create marketable innovations.

Policies support and Funding as Nigerian government is enacting policies to support the Triple Helix Model, such as incentives for industry-academic collaborations and funding for research

initiatives. In this case, grants and funding is made available for joint projects between universities and industries for the stimulation of innovation and economic growth.

Entrepreneurship and Start-Up Incubation within tertiary institution to support student and faculty start-ups, fostering a culture of entrepreneurship. For effective achievement, there is initiation of mentorship programs and collaboration with industry experts to provide control and guidance for institutional -affiliated start-ups (Cai & Amaral, 2022).

Knowledge and Technology Transfer become eminent as there is initiation of Technology Transfer Offices (TTOs) in some tertiary institutions   to facilitate the transfer of research outputs to the industry, ensuring that innovations reach the market. By this situation, Intellectual Property (IP) Management system is strengthening and frameworks develop to protect and commercialize university research findings (Anttonen, Lammi, Mykkänen & Repo, 2022).

There is the desire for capacity building and skill development through Curriculum Reforms in the universities. In other words, universities are revising their curricula to include courses that align with industry needs, focusing on skills like digital literacy, data analysis, and advanced manufacturing techniques (Popoola, 2022). For the actualization of the reformation in the curriculum content and processes, there is an avenue for professional development programs infuse for effective collaboration with industries to provide training and development programs for faculty and students as well as enhancing practical skills and employability.

Regional innovation clusters   that establishment of regional innovation hubs that bring together universities, industries, and government agencies to collaborate on projects and drive regional development. For example, projects like Special Economic Zones (SEZs) closed or near universities attract industries and create a conducive environment for innovation and entrepreneurship.

Engaging and adopting of digital transformation and ICT integration to create smart campuses that enhance learning, research, and administrative processes. In this regards, the online collaboration platforms can effectively facilitate collaboration between universities, industries, and government bodies (Echono, 2024).

There are collaborative efforts or   partnerships with international institutions and industries to exchange knowledge, technology, and best practices. This will enhance joint research initiatives and participation in international research consortia and projects to leverage global expertise and funding opportunities (Gachie, 2020).

Challenges to the Application of Triple Helix Partnership in Educational Administration and Planning

The application of the Triple Helix model encompassing collaboration among academia, industry, and government in educational administration and planning faces several challenges. Understanding these obstacles is crucial for effectively implementing this model in educational contexts. Asymmetry of Power and Capabilities is one significant challenge as there is always disparity in power and capabilities among the key factors involved. If one party lacks the necessary resources or influence, it can hinder effective collaboration and limit the potential outcomes of the partnership (Galvao, Mascarenhas, Marques & Ferreira, 2019).

Definitional ambiguity affects the Triple Helix model as it is often interpreted in various ways, leading to confusion regarding its implementation. This ambiguity can complicate communication and operationalization, making it difficult for educational institutions to align their objectives with those of industry and government partners (Ranga & Etzkowitz,2013).

Achieving a balance between the diverse interests and demands of the three sectors can be challenging. Each actor may have different priorities, which can lead to conflicts and misalignment in goals, particularly in educational settings where the focus is on student outcomes and innovation. The relationships within Triple Helix partnerships may suffer from structural deficiencies, such as lack of formal agreements or unclear roles. This can lead to inefficiencies and a lack of commitment from partners, undermining the collaborative efforts necessary for successful educational initiatives

Effective collaboration often requires significant resources such as financial, human, and infrastructural. Limited access to these resources can restrict the ability of educational institutions to engage meaningfully with industry and government, particularly in emerging markets. Need for Institutionalization or formal structures that promote transparency, shared decision-making and mutual accountability among partners. This includes establishing clear protocols for collaboration and funding arrangements (Carayannis & Campbell, 2009).

Conclusion

For Nigeria's tertiary education sector to advance innovation and economic growth, the Triple Helix Model, which promotes collaboration between universities, businesses, and government, is essential. In Nigerian tertiary institutions, the Triple Helix Partnership model holds great promise for revolutionizing educational planning and administration. Through the promotion

of cooperation between the public and private sectors as well as academic institutions, this model can assist in addressing a number of issues, including financial limitations, streamlined administrative procedures, curriculum alignment with industry demands, efficient management of intellectual property, capacity building, improved infrastructure, and policy support for the education sector through resource sharing, strategic planning, and creative teaching and learning methods. This will eventually contribute to improving educational standards and producing a workforce that is more knowledgeable and skilled.

Recommendations

Tertiary institutions, industries, and government agencies should work together to streamline administrative processes, reducing bureaucratic hurdles that impede collaboration. This can involve establishing clear guidelines and fast-track procedures for joint projects

Tertiary institutions should regularly review and update their curricula to ensure they align with current industry needs. This can be done by involving industry experts in curriculum development and incorporating practical training component.

Expand internship and apprenticeship programs that provide students with hands-on experience in their fields of study. This can help bridge the skill gap and make graduates more industry-ready.

Tertiary institutions should establish Technology Transfer Offices (TTOs) to manage and commercialize research outputs effectively. These offices can assist in securing patents, licensing technologies, and negotiating industry partnerships. In other words, there is need to develop clear and robust intellectual property (IP) policies that protect the interests of all parties involved in collaborative projects. This can help in building trust and encouraging more industry participation.

Enhance digital infrastructure to support online collaboration platforms, virtual labs, and remote learning tools. This can facilitate seamless interaction between universities, industries, and government bodies

Implement change management strategies to overcome cultural and institutional resistance to collaboration. This can involve awareness campaigns, workshops, and training sessions to promote the benefits of the Triple Helix Model. In this case, collaborative platforms and forums can be established for regular interaction between universities, industries, and government

bodies. These platforms can facilitate knowledge exchange, joint problem-solving, and the development of innovative solutions.

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Effective Resource Utilization in Revitalising Educational Productivity in Nigeria: Challenges and Strategies

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Abstract

Nigeria's educational sector faces significant productivity challenges, hindering its potential to drive sustainable development. These challenges are inadequate funding, corruption and mismanagement of resources, inefficient resource allocation, shortage of qualified teachers, poor infrastructure etc. The paper examines the interplay between resource allocation, utilization, and management, and identify key strategies for optimizing resource use which are, planning and management, financial management, human resource development, infrastructure development, technology integration, community engagement etc. The paper concluded that effective resource utilization can enhance teaching and learning outcomes, improve educational quality, and increase productivity. This paper contributes to the ongoing discourse on educational reform in Nigeria by providing actionable insights for policymakers, educators, stakeholders seeking to revitalize the educational section and drive sustainable development. The paper suggests that government should prioritize education by increasing the budget allocation to 15% of the national budget, implementing accountability mechanisms to ensure that educational resources are efficiently utilized, and investing in infrastructure development to provide schools with the resources necessary to deliver high-quality education and foster educational productivity.

Keywords: Educational productivity, Infrastructure development, Resource utilization, Teacher training, and Technology integration.

Introduction

Education is the bedrock of any nation's progress, serving as a catalyst for economic growth, social mobility, and cultural advancement. A well-structured educational system can empower individuals, foster innovation, and enhance national competitiveness. However, Nigeria's educational sector faces numerous challenges, which are inadequate funding, corruption and mismanagement of resources, inefficient resource allocation, shortage of qualified teachers, poor infrastructure etc, hindering its potential to drive national development. Despite government initiatives to improve the quality of education, the country's educational system continues to grapple with inadequate resource utilization, inefficient allocation of resources, and poor educational outcomes. Despite acknowledging the importance of education, the Nigeria government's investments in the sector have failed to yield the desired outcomes.

Despite substantial resource allocation, educational outcomes in Nigeria continue to fall short of global standards, with inadequate infrastructure, shortage of qualified teachers, and outdated curricula contributing to poor student achievement and limited opportunities for socio-economic mobility (Adebayo, 2018; UNESCO, 2019).

The urgency to revitalize educational productivity in Nigeria cannot be overstated. Education plays a crucial role in human capital development, developing skilled workers, innovators, and entrepreneurs who drive economic growth. It increases productivity that is, improved education leads to higher productivity, as a more skilled workforce can produce more with the same resources. Revitalizing educational productivity helps countries remain competitive in the global economy and also addresses the challenges of effective utilization of resources in Nigeria. Efficient resource utilization is key to improving educational outcomes. To achieve educational objectives, financial, human, and material inputs must be allocated and managed efficiently. However, Nigeria's educational sector is plagued by inefficient resource utilization, resulting in wasted resources and duplicated efforts, hampering the sector's ability to make significant strides in improving educational outcomes (World Bank, 2019).

The primary objective of this study is to explore perspectives on effective resource utilization as a means of revitalizing educational productivity in Nigeria. By examining the challenges facing the Nigerian education sector and identifying potential strategies for optimizing resource use.

Different studies have carried out on resource utilization and revitalizing the education sector. Agabi (2010) in a study prudential approach to resource management in Nigerian education: a theoretical perspective. She said that resource scarcity is a problem experienced by virtually all human organizations. The Nigerian education sector has endured consistently declining levels of federal government funding over the last two decades. This comes in the face of ever-increasing inflation rates and a growing demand for formal education. This untenable situation is compounded by the compulsory and free Universal Basic Education (UBE) programme which expanded free education from six years of primary education to nine years of basic education. In addition to lengthening the programme's timeframe, its target population was expanded to include out-of-school youths and adults who, for one reason or the other, did not complete a regular formal education. Unfortunately, this zeal for providing education as a social service in Nigeria has not been matched with a zeal for funding it. The under-funding of Nigerian education has been made worse by recent global economic crises. This paper

recommends the exploration of non-governmental sources of funding, and the application of prudent measures for managing existing educational resources.

Anochiwa, Uma, Aniagolu and Ogbonna (2016) also wrote on reviving education in Nigeria for sustainable economic growth: issues, problems and prospects. They said Education has been identified as a critical agent in the development of a modern society because it plays a pivotal role in training and building human capacity for the nation. It is argued "as information grows exponentially, and its incorporation in the production process becomes increasing complex, the ability to absorb, and adapt new knowledge is determined by the nature, quality and quantity of the education system". Nigerian government played the „Ostrich" while its educational system headed for a total collapse. Therefore, except the system is revived and revamped, it will be a mirage for the country to catch up with the global competitiveness. As a way forward, Government must increase funding, tackle corruption and improve infrastructure. Excellence must be rewarded and indigenous R&D improved. They must stem the tide of brain drain by creating environment for good education.

Conceptual Clarification

Revitalizing educational productivity in Nigeria: a perspective on effective resource utilization
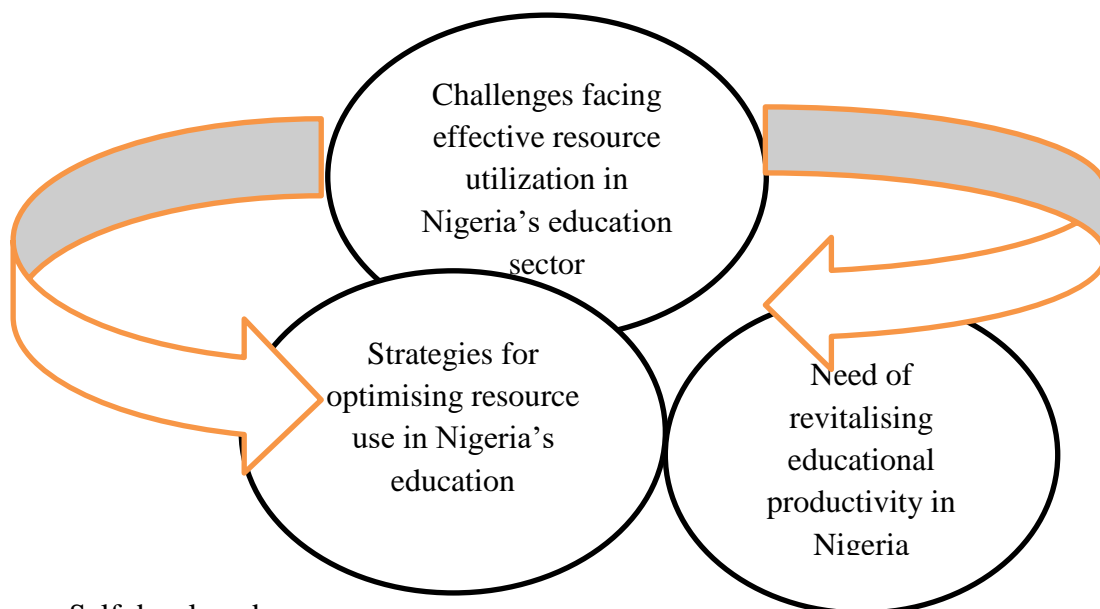
Source: Self developed

Resource utilization

Resources are crucial for the survival and functioning of any organization. Without these assets, organizations would have no personnel or means to accomplish their objectives. Resources encompass all the inputs necessary for an organization to achieve its goals, including human,

financial, time, and material resources (John, 2023). The effective allocation and management of resources to achieve organizational goals is referred to as resource utilization (Krajewski, Lee, Manoj, Malhotra, & Larry, 2013). Resource utilization entails the efficient and effective use of various resources, such as financial, human, material, and technological resources, to achieve desired outcomes (Werner & Desimone, 2012). Optimal resource allocation to maximize productivity, efficiency, and effectiveness is central to resource utilization (Cooper, Douglas, Janet, Dobler, Randall, Gibson, & William, 2014).

Types of resource utilization

Resource utilization have been classified into ten groups and include human, financial, material, technological, natural, intellectual, time, information, infrastructure and social resource utilization. We will be discussing four out of the ten resource utilization.

1. Human resource utilization involves the efficient management of human resources, encompassing recruitment and selection, training, and development, performance management, employee engagement, and talent management to optimize organizational productivity and efficiency (Noe, Raymond, John, Hollenbeck, Barry, & Patrick, 2017).

2. The efficient management of financial resources, including budgeting, investment and funding, financial reporting and analysis, cost control and reduction, is known as financial resource utilization (Brigham & Houston, 2012).

3. Material resource utilization focuses on the efficient use of various physical resources, including equipment and machinery, supplies and inventory, facilities and infrastructure, transportation and logistics, and energy and utilities. Efficient management of these resources reduces waste, enhances efficiency, and improves productivity (Heizer & Render, 2014).

4. Technological resource utilization encompasses the efficient use of various technological resources, including information technology, communication technology, data analytics and business intelligence, digital marketing and e-commerce, and cybersecurity. Efficient management of these technologies leads to increased innovation, efficiency, and competitiveness (Laudon & Laudon, 2015).

Challenges facing effective resource utilization in Nigeria's education sector

Nigeria's education sector is faced with numerous problems some of which include:

1. Inadequate funding

Nigeria's education sector suffers from inadequate funding, leading to various challenges for schools, teachers, and students. This lack of funding manifests in insufficient classrooms, and infrastructure; learning environments; limited educational materials such as textbooks, and technology; insufficient investment in teacher training and development and low teacher salaries and benefits, which can negatively impact teacher motivation and retention (Oke, 2020).

2. Corruption and mismanagement

Corruption and mismanagement of resources pose significant obstacles to effective resource utilization in the education sector. This phenomenon manifests in various ways, such as: embezzlement of funds designated for educational purposes, reducing the resources available for schools and students. Misallocation of resources, with priority given to personal interests over educational needs. Nepotism and favoritism in resource allocation, leading to inequitable resource distribution. Lack of transparency and accountability, which can create a culture of impunity and discourage effective resource utilization (UNESCO, 2019).

3. Inefficient resource allocation

Inefficient allocation of resources can result in waste and duplication of efforts in the education sector. This may include: Inadequate needs assessment, leading to resources being allocated to low-priority areas while critical needs remain unmet. Poor distribution of resources, with some schools receiving an overabundance of resources while others remain underserved. Lack of prioritization, with resources allocated to areas with low returns on investment rather than to areas with the greatest potential impact. Inefficient use of technology, such as failing to harness the potential of digital tools and platforms to streamline resource allocation and management (World Bank, 2019).

4. Shortage of qualified teachers

The shortage of qualified teachers is a pressing issue in the education sector, adversely affecting educational quality. This includes the following challenges: Insufficient teacher training and professional development, leading to subpar teaching methods and limited instructional expertise. Limited subject matter expertise, hindering teachers' ability to provide effective instruction. High teacher turnover rates, leading to a lack of stability and continuity in the teaching profession. Inadequate teacher motivation, which can result from low salaries, lack of resources, and limited professional development opportunities (NUT, 2020).

5. Poor infrastructure

Inadequate infrastructure in classrooms and libraries negatively impacts learning outcomes. This includes: Insufficient classroom space, leading to overcrowding and limited individualized instruction. Poor ventilation and lighting, creating an uncomfortable and distracting learning environment. Limited access to technology, such as computers and interactive whiteboards, hindering the use of modern instructional methods. Inadequate library resources, including limited access to books, journals, and other learning materials (FGN, 2020).

6. Inadequate teacher training

Poor teacher training programs negatively impact the effectiveness of teachers, resulting in the following challenges: Limited professional development opportunities, limiting teachers' ability to keep up with new educational trends and methodologies. Inadequate subject matter training, hindering teachers' ability to teach specific subjects effectively. Lack of training in technology integration, hampering the utilization of modern technologies to enhance instruction. Inadequate classroom management training, making it difficult for teachers to manage student behavior effectively (Adebayo, 2018).

7. Lack of educational materials

Insufficient educational materials, such as textbooks and technology, negatively affect learning outcomes. This includes the following challenges: Outdated textbooks that fail to reflect the latest academic research and advancements in various disciplines. Limited access to digital resources, such as e-books, online educational platforms, and educational software, hampering students' ability to engage with modern learning methods. Inadequate science and laboratory equipment, impeding hands-on learning and experimentation. Limited access to libraries, limiting students' exposure to diverse reading materials (WAEC, 2020).

8. Inefficient use of technology

Inefficient use of technology in education hinders productivity and learning outcomes. This includes the following challenges: Limited access to technology, such as computers, tablets, and internet-enabled devices, limiting students' and teachers' ability to harness the power of technology in education. Inadequate technology training, preventing teachers from effectively integrating technology into their teaching and students from utilizing digital tools for learning. Poor internet connectivity, impeding access to online educational resources and collaborative learning opportunities. Inefficient use of educational software, such as learning management

systems and digital textbooks, leading to suboptimal utilization of available technology (Laudon & Laudon, 2015).

9. Poor maintenance culture

A poor maintenance culture can cause rapid deterioration of educational infrastructure, including the following challenges: Lack of regular maintenance, leading to breakdown of equipment and facilities, and the need for costly repairs or replacements. Inadequate repair and replacement of worn-out or damaged infrastructure, further exacerbating deterioration. Poor waste management, resulting in an unhygienic learning environment and potential health hazards. Inadequate cleaning and sanitation, leading to a dirty and unsanitary learning environment (Heizer & Render, 2014).

10. Lack of community participation

The lack of community participation in education can hinder resource utilization, including the following challenges: Limited parental involvement, leading to reduced support and guidance for students' educational development. Inadequate community engagement, reducing the pool of potential resources and support for educational programs. Lack of local support, hindering the implementation of educational initiatives and the mobilization of community resources. Limited partnerships with local organizations, such as businesses, NGOs, and community groups, impeding collaboration and resource sharing (Hitt Miliordos, Park, Park, & Ramchandani, 2011).

11. Inadequate data management

Inadequate data management can hinder informed decision-making in the education sector, including the following challenges: Limited data collection, resulting in insufficient information for decision-making and poor understanding of educational needs and outcomes. Inadequate data analysis, resulting in poorly informed decisions based on incomplete or incorrect data. Poor data storage and retrieval, hindering the ability to access and use data effectively. Inadequate data-driven decision-making, leading to suboptimal allocation of resources and ineffective educational policies and programs (Krajewski et al., 2013).

12. Political interference

Political interference in the education sector can adversely affect resource utilization, including: Political appointment of educators based on political affiliation rather than educational qualifications, hindering the effectiveness of educators and the quality of instruction. Political

influence on curriculum, leading to politicized and biased educational content. Political interference in education policy, resulting in policies that prioritize political interests over educational needs. Limited autonomy for educators, reducing their ability to make decisions based on educational needs and priorities (Werner & Desimone, 2012).

Need of revitalizing educational productivity in Nigeria

To revitalize educational productivity in Nigeria, a holistic approach must be adopted that addresses key areas such as infrastructure, teacher training, curriculum, technology, governance, and funding. Through coordinated and strategic implementation of these strategies, the country can improve educational outcomes, foster innovation and creativity among students, and position itself to compete in the global economy. This in turn will contribute to Nigeria's overall economic growth, social development, and global competitiveness (Akinkugbe, 2013). Challenges of revitalizing educational productivity in Nigeria.

1) **Low enrollment rates:** The United Nations Children's Fund (UNICEF, 2020) reports that Nigeria has one of the lowest enrollment rates in the world, with only 61% of children aged 6-11 years enrolled in primary education, and only 42% of adolescents aged 12-14 years enrolled in secondary education. This low enrollment rate poses a significant challenge to the country's educational productivity, as fewer students are accessing the educational resources and opportunities necessary for personal and societal development.

2) **Poor infrastructure:** According to the World Bank (2018), poor infrastructure in Nigerian schools, including inadequate classroom space, limited access to technology, and insufficient power and water supply, hampers the ability of teachers to deliver quality education, leading to lower student performance and reduced educational productivity.

3) **Inadequate teacher training:** The National Educational Research and Development Council (NERDC, 2017) highlights the inadequacy of teacher training in Nigeria as a major factor contributing to low educational productivity, with many teachers lacking the skills and knowledge required to effectively deliver the curriculum and promote student learning.

4) **Outdated curriculum:** According to the Federal Government of Nigeria (FGN, 2019), the outdated curriculum in many Nigerian schools, which fails to reflect the changing needs of the 21st century economy and society, hinders the development of critical thinking, creativity, and other 21st century skills essential for educational productivity.

5) **Corruption and mismanagement:** Transparency International (2020) points to corruption and mismanagement in Nigeria's educational system as a major factor undermining educational productivity, with resources intended for educational development being diverted for personal gain, resulting in inadequate funding for school facilities and teacher training, and reduced effectiveness of educational programs.

6) **Inadequate funding:** UNESCO (2019) highlights that inadequate funding for education in Nigeria, particularly for teacher training, infrastructure development, and educational resources, is a key factor impeding educational productivity, as limited financial resources prevent schools from investing in innovative programs, updating technology, and supporting teachers in their professional development.

7) **Inefficient resource allocation:** The World Bank (2018) indicates that inefficient resource allocation in Nigeria's educational system, characterized by inadequate budgeting, corruption, and unequal distribution of funds among schools, undermines educational productivity by limiting the ability of schools to purchase adequate materials, attract and retain qualified teachers, and implement effective instructional programs.

Strategies for optimizing resource use in Nigeria's education

1. Planning and management

There are several key steps that can be taken to improve resource utilization in the education sector, including conducting a needs assessment and resource mapping, prioritizing resource allocation based on educational objectives, developing and implementing resource utilization policies, establishing resource management committees, and developing and implementing a national education strategic plan. These steps can help to ensure that resources are allocated efficiently and effectively, maximizing their impact on educational outcomes and enhancing the quality of education in the country (Adebayo, 2018).

2. Financial management

Effective financial management in the education sector requires a multi-pronged approach, including increasing budgetary allocation to education, improving financial management and transparency, exploring alternative funding sources, and implementing cost-saving measures. These steps can help to ensure that educational institutions have the financial resources they need to deliver high-quality education and achieve their objectives (Oke, 2020).

3. Human resource development

Human resource development in the education sector is crucial for enhancing the quality of education. Several key steps can be taken to support human resource development, including implementing teacher recruitment and retention programs, providing ongoing professional development and training opportunities for teachers, and investing in staff capacity building and development. These measures can help to ensure that educational institutions have a highly skilled and motivated workforce that is able to deliver high-quality education (NUT, 2020).

4. Infrastructure development

Effective infrastructure development and maintenance in the education sector is crucial for ensuring safe and functional learning environments. Several key steps can be taken to support infrastructure development, including investing in school infrastructure development and maintenance, implementing infrastructure maintenance and upgrade plans, promoting community-based resource mobilization, and leveraging technology for educational delivery. These measures can help to enhance educational infrastructure and ensure that educational institutions have the resources they need to support effective teaching and (WAEC, 2020).

5. Technology integration

Effective technology integration in the education sector can help to enhance teaching and learning outcomes. Several key steps can be taken to support technology integration, including implementing e-learning platforms and digital resources, utilizing educational software and applications, and developing and implementing virtual and augmented reality learning experiences. These measures can help to provide students with access to innovative and engaging learning environments that support personalized learning and enhance educational outcomes learning (UNESCO, 2019).

6. Community engagement

Community engagement is essential for enhancing educational outcomes and fostering a strong and supportive educational environment. Several key steps can be taken to promote community engagement, including promoting community participation and ownership in educational initiatives, engaging parent-teacher associations (PTAs) in educational activities, and implementing school-based management and decision-making. These measures can help to create a collaborative and supportive educational environment that involves community members in shaping educational policies and programs (Oke, 2020).

7. Institutional development

Effective institutional development in the education sector is crucial for supporting high-quality educational outcomes. Several key steps can be taken to enhance institutional development, including establishing centralized resource management systems, empowering teachers, developing and implementing teacher career progression plans, and promoting public-private partnerships (PPPs). These measures can help to create a strong and sustainable educational system that supports educational excellence and enhances student learning and development (World Bank, 2019).

Conclusion

Revitalizing educational productivity in Nigeria requires a multifaceted approach that addresses inadequate funding, corruption, inefficient resource allocation, and poor infrastructure. Effective resource utilization is critical to improving education outcomes, driving economic growth, and enhancing social development.

Suggestions

The following suggestions are preferred based on extant literature reviewed on strategies for revitalizing educational productivity.

1. Government should prioritize education by increasing the budget allocation to 15% of the national budget, implementing accountability mechanisms to ensure that educational resources are efficiently utilized, and investing in infrastructure development to provide schools with the resources necessary to deliver high-quality education and foster educational productivity.

2. Private sector organizations should collaborate with the government in infrastructure development projects to improve the educational environment and facilitate educational productivity, and support teacher training initiatives to ensure that teachers have the knowledge and skills necessary to implement innovative teaching methods and enhance student learning.

3. Civil society organizations should champion education reform by advocating for government policies and initiatives that prioritize educational productivity, and monitor resource utilization to ensure that educational funds are allocated equitably and efficiently, holding government and private sector actors accountable for the effective delivery of educational services.

4. International organizations should leverage their expertise and resources to provide technical assistance and support capacity-building initiatives in Nigeria's educational sector, helping to strengthen infrastructure, develop teacher training programs, and improve educational delivery, ultimately contributing to improved educational productivity.

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Influence of Social Media on the Academic Performance of Public Secondary School Students in Port Harcourt, Rivers State.

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Abstract

There is no doubt that the proliferation of social media across various levels of education in the world has raised concerns among stakeholders regarding its impact on student academic performance. This study investigated the effect of three different social media platforms (YouTube, WhatsApp, and Google) on the academic performance of public secondary school students in Port Harcourt, Rivers State. The study contributed to the existing body of knowledge on the impact of social media on academic performance in Port Harcourt. At the same time, developing strategies and insights on maximizing the benefits and minimizing the cost of social media usage among students. A combined research design of descriptive survey and qualitative data collection (structured interview) was used to elicit respondents' opinions (300 students and 100 teachers). The findings revealed that excessive and improper use of YouTube and WhatsApp by students negatively impacts the academic performance of students as expressed in a grand mean of 2.16 and 1.89 respectively. Google positively impacts students' academic performance when used for academic purposes with a grand mean of 3.76. Based on these findings, the study recommends that educators and parents monitor students' social media usage to promote the responsible use of these platforms to enhance academic performance.

Keywords: Influence, Social Media, Academic Performance, and Public Secondary School.

Introduction

The emergence of social media has completely changed how individuals engage, communicate, and obtain information. Students in Port Harcourt, Rivers State, public secondary schools are using social media sites like Google, WhatsApp, and YouTube more and more. Social media has many advantages, but its effects on academic performance have drawn criticism. Overuse of social media has been connected to poor educational habits, a shorter attention span, and lower academic accomplishment. Particularly Google, WhatsApp, and YouTube have ingrained themselves into students' daily life and may have an impact on their academic achievement. In order to offer educators, parents, and legislators with valuable information, this study examines the impact of various social media platforms on the academic achievement of

public secondary school pupils in Port Harcourt, Rivers State (Sam Jaja & Sam-Kalagbor, 2023).

Social media's explosive expansion has changed how people connect, communicate, and get information. Particularly for teenagers, social media sites like Google, WhatsApp, and YouTube have become an essential aspect of contemporary life. Students in Port Harcourt, Rivers State, public secondary schools are not an exception. The amount of time these youngsters spend on social media is growing, and this has sparked worries about how it can affect their academic performance. Social media provides many advantages, such as entertainment, connectivity, and information access. On the other hand, overuse of social media has been connected to a number of drawbacks, such as a shorter attention span, worse study habits, and worse academic performance. The ceaseless barrage of alerts, messages, and updates can be annoying, making it difficult for pupils to concentrate (Opara, 2018).

The multicultural metropolis of Port Harcourt, in Rivers State, has a high degree of social media penetration. Students in this region's public secondary schools are exposed to a variety of social media platforms, which may have an impact on their academic performance. The purpose of this study is to look into how Google, WhatsApp, and YouTube affect public secondary school pupils' academic performance in Port Harcourt, Rivers State. By examining this subject, the study hopes to offer guidance to legislators, parents, and educators on how to encourage social media usage that is responsible while also improving academic achievement (Nwosu, 2020).

Statement of the Problem

Complaints about social media's potential effects on academic performance have been raised by Port Harcourt, Rivers State, public secondary school pupils' growing usage of the platform. Even though social media has several advantages, overuse has been connected to poor study habits, worse academic achievement, and a shorter attention span. Students find it difficult to concentrate on their academics due to distractions caused by the pervasive usage of Google, WhatsApp, and YouTube. Parents and educators are concerned that social media use is harming their children's academic performance, but there isn't any concrete data to back up this assertion. The purpose of this study is to look into how Google, WhatsApp, and YouTube affect public secondary school pupils' academic performance in Port Harcourt, Rivers State, to give stakeholders information they may use to create plans that encourage social media usage in a responsible manner and improve academic achievement.

Purpose of the Study

Generally, the purpose of the study is to find out the influence of social media on the academic performance of public secondary school students in Port Harcourt, Rivers State. Specifically, the purpose of the study is to find out:

1) Investigate the effect of YouTube on the academic performance in public senior secondary schools in Port Harcourt City, Rivers State.

2) Determine the impact of WhatsApp on students' academic performance in public senior secondary schools in Port Harcourt City, Rivers State.

3) Ascertain the influence of Google on students' academic performance in public senior secondary schools in Port Harcourt City, Rivers State.

Research Questions

For the purpose of this research the following research questions were developed;

1) What is the positive effect of YouTube on the academic performance in public senior secondary schools in Port Harcourt City, Rivers State?

2) What is the positive impact of WhatsApp on students' academic performance in public senior secondary schools in Port Harcourt City, Rivers State?

3) What is the positive influence of Google on students' academic performance in public senior secondary schools in Port Harcourt City, Rivers State?

Literature Review

Theoretical Review

Deci and Ryan's "Self-Determination Theory" (SDT) propounded in 2000, provides a suitable theoretical framework for the study on the influence of students' use of social media on academic achievement. According to SDT, there exist three fundamental psychological demands that drive human behaviour:

1) Autonomy: having a sense of agency and control.

2) Competence: a sense of effectiveness and ability.

3) Relatedness: a sense of belonging and appreciation.

Students' academic performance can be impacted by social media (YouTube, WhatsApp, and Google among others) positively or negatively. The SDT states as an illustration that;

Autonomy: excessive usage of social media might cause distractions, which diminishes one's ability to be in charge of their education.

Competence: Social media can boost feelings of competence by giving users access to resources and knowledge, but excessive usage of the platform can also lower academic accomplishment.

Relatedness: While social media can help children connect with teachers and friends, overuse of the platform can also cause social isolation.

The SDT can be used to explain how students' use of social media affects their engagement and motivation, which in turn affects their academic performance positively or negatively (Okoro, 2019).

Conceptual Review

Effect of YouTube on Academic Performance
YouTube has billions of users worldwide and has become an essential element of modern life. With its wide selection of instructional videos and tutorials, YouTube may be a helpful learning tool for students. On the other hand, excessive YouTube viewing can harm academic achievement. According to studies, students who watch more YouTube videos also typically spend less time studying and have poorer GPAs. One major drawback with YouTube is that it may be very distracting. Students may quickly become enmeshed in a vortex of non-academic content due to the never-ending recommendations and notifications, which will reduce their focus and productivity. Moreover, watching movies passively might impair critical thinking and problem-solving abilities, which are crucial for success in school (Osuji, Sam Jaja, & Amaewhule, 2024).

Even though YouTube can be a helpful addition to traditional education, it shouldn't take the role of in-person instruction, experiential learning, and critical thinking. Parents and teachers need to encourage safe usage of YouTube in order to lessen its detrimental effects on students' academic achievement. This may entail monitoring usage, promoting active learning techniques, and placing restrictions on screen time. Teachers can also use YouTube to their advantage by including instructional videos into their lesson plans. This will help students maintain a good balance between using technology and studying conventional ways. By recognizing YouTube's advantages as well as disadvantages, we can make sure that students use this useful resource to improve rather than degrade their academic performance (Ogbonna, 2018).

Impact of WhatsApp on Academic Performance

WhatsApp, which provides a practical and quick messaging network, has completely changed the way students communicate. On the other hand, using WhatsApp excessively can hurt your grades. Studies have indicated that pupils with higher WhatsApp usage likely to have worse grades and shorter attention spans. Students may find it difficult to concentrate on their academics due to the constant barrage of notifications and texts. Additionally, WhatsApp may encourage procrastination and lower output. It's possible for students to find themselves idly scrolling through discussions, losing important study time. Memes and non-academic talks might compete for attention in group chats, which can also be a major source of distraction. Furthermore, the instantaneous speed of WhatsApp may prevent users from reflecting and thinking deeply, two qualities that are crucial for scholastic achievement (Afolabi, 2017).

In order to reduce the detrimental effects of WhatsApp on academic achievement, students need to set limits and develop responsible using practices. This can involve setting aside time for "study-only" activities, turning off notifications, and staying away from group discussions when studying. In addition, parents and educators can contribute by encouraging responsible technology use and keeping an eye on it. Students can utilise WhatsApp for cooperation and communication while staying focused on their academic objectives if they are aware of its possible drawbacks (Nwokocha, 2019).

Influence of Google on Academic Performance

Google provides students with unmatched access to knowledge, revolutionising the way they access and process information. Students can explore new topics, find answers to challenging questions, and access a wealth of instructional resources with just a few clicks. Academic achievement has been impacted by this convenience in both positive and negative ways. Google can, on the one hand, speed up research, improve comprehension, and save time. Pupils can easily access original materials, investigate other viewpoints, and double-check facts. But an over-reliance on Google might impair one's ability to think critically and solve problems. Pupils who rely too much on search results might not be able to hone their own analytical skills. Furthermore, students may experience information overload as a result of the wealth of information, which makes it difficult for them to distinguish reliable sources from false ones. This may lead can result in shallow understanding and poor academic performance (Iwu, 2019).

Furthermore, a lack of comprehension and memory may result from Google's rapid pleasure. Instead of reading and understanding the material, students could rely on brief summaries and

bullet points. Deep learning and academic achievement may be hampered by this. Furthermore, students may become less motivated and put in less effort as a result of Google's constant accessibility because they will be more dependent on technology than on their own skills. Students need to establish responsible search habits and critical thinking abilities in order to maximise the positive aspects of Google while minimising its negative aspects. Teachers can make a significant contribution by fostering innovative ideas, developing analytical skills, and teaching information literacy. By understanding Google's advantages and drawbacks, students can use it to improve their academic performance and acquire crucial (Amadi, 2020).

Review of Related Literature

Researchers, educators, and politicians have been interested in the impact of social media on academic achievement. Examining previous research on social media's effect on academic achievement, this review of the literature focusses on Google, YouTube, and WhatsApp. With billions of users utilising different social media platforms for connection, communication, and information access, social media has become an essential component of modern life. Students in public secondary schools are not an exception, and worries about how their usage of social media affects their academic performance have been raised.

Numerous researches have looked into the connection between academic achievement and social media use. According to a 2010 study by Asodike and Sam Jaja (2012), students who utilised social media often spent less time studying and had poorer GPAs. Similar findings were made by Chinda (2020), who discovered a link between poorer academic accomplishment and extensive social media use. Among the most often utilised social media sites by students in public secondary schools are YouTube, WhatsApp, and Google. YouTube is a website where users may share videos and access a wide variety of entertaining and informative content. With the help of the messaging program WhatsApp, friends and relatives may communicate instantly. One search engine that offers a wealth of information is Google.

Methodology

This study employed a descriptive survey research design method was used for data collection and analysis methods. The study population consisted of 330 public secondary school students and 143 teachers in 15 public secondary schools in Port Harcourt, Rivers State. A survey questionnaire was administered to the students to gather data on the impact of three major social media platform (YouTube, WhatsApp and Google) usage, their influence on students' academic performance. The questionnaire consisted of a total of fifteen (15) items, including and a

modified four (4) point Likert scale ratings was used to analyse the results. The data analysis was done using SPSS software. Descriptive statistics were used to analyze the demographic data, while mean and standard deviation were used to examine the influence of these social media platforms on academic performance.

Findings of the Study

The data for this study is hereby presented and analyzed below using a mean and standard deviation to answer the three research questions as appropriate.

Research Question One:

What is the positive effect of YouTube on the academic performance in public senior secondary schools in Port Harcourt City, Rivers State?

Table 1: Mean and standard deviation on the positive effect of YouTube on the academic performance in public senior secondary schools in Port Harcourt City.

S/N	Items	Teachers		Students		Total Mean	Decision
		MEAN $\overline{X}$	**SD$_1$**	**MEAN** $\overline{X}$	**SD$_1$**		
1.	YouTube improves students' commitment to academic activities.	2.39	0.86	2.23	0.50	2.31	Disagreed
2.	A lot of time is spent studying by students through the use of YouTube.	2.36	0.61	2.19	0.53	2.27	Disagreed
3.	YouTube has positive influence on students' grammatical skills.	2.52	0.64	2.43	0.57	2.47	Disgreed
4.	Students' research work has been improved as a result of YouTube.	2.39	0.59	2.28	0.54	2.33	Disagreed
5.	The use of pidgin English by students has reduced due to students' use of YouTube.	2.47	0.69	2.39	0.56	2.43	Disagreed
	Average Grand Total	**2.43**	**0.68**	**2.30**	**0.54**	**2.36**	**Disagreed**

Source: Field Survey, 2024.

From table 1, the items 1, 2, 3, 4, and 5 were all disagreed upon by both teachers and students that YouTube has a positive effect on the academic performance in public senior secondary schools in Port Harcourt City. Specifically, the result shows that teachers and students both strongly oppose the notion a lot of time is spent studying by students through the use of YouTube (item 2), this is evident with the low total mean score of 2.27. While item 3 had the highest mean score of the table with a total mean of 2.47 on the issue that YouTube has positive influence on students' grammatical skills. Thus, based on the low average grand total mean score rating it is assessed that YouTube has a negative influence the academic achievement among public senior secondary school's students in Port Harcourt, Rivers State.

Research Question Two:

What is the positive impact of WhatsApp on students' academic performance in public senior secondary schools in Port Harcourt City, Rivers State?

Table 2: Mean and standard deviation on the positive Impact of WhatsApp on the academic performance in public senior secondary schools in Port Harcourt City.

S/N	Items	Teachers		Students		Total Mean	Decision
		MEAN $\overline{X}$	SD$_1$	MEAN $\overline{X}$	SD$_1$		
6.	The use of WhatsApp improves spelling ability of students.	2.78	0.63	2.53	0.58	2.65	Agreed
7.	WhatsApp allows students to discuss academic issue beyond the school environment	3.41	0.56	3.38	0.56	3.39	Agreed
8.	WhatsApp facilitate rapid dissemination of information among Students.	3.49	0.58	3.62	0.60	3.55	Agreed
9.	WhatsApp promote collaborative work among students.	3.69	0.61	3.43	0.57	3.56	Agreed
10	WhatsApp allow for easy sharing of learning materials among Students which improves academic performance.	3.71	0.62	3.45	0.59	3.58	Agreed
	Average Grand Total	**3.42**	**0.60**	**3.28**	**0.58**	**3.45**	**Agreed**

Source: Field Survey, 2024.

From table 2 above, the items 6, 7, 8, 9, and 10 were all agreed upon by both teachers and students that WhatsApp has a positive impact on the academic performance in public senior secondary schools in Port Harcourt City. Specifically, the result shows that teachers and students both strongly agreed on the point that WhatsApp allow for easy sharing of learning materials among students which improves academic performance as indicated on item 10 with a total mean of 3.58. While item 1 had the lowest total mean score of 2.65 on the table on the issue the use of WhatsApp improves spelling ability of students. Thus, based on the high average grand total scores rating it is assessed that WhatsApp has a positive influence the academic achievement among public senior secondary school's students in Port Harcourt, Rivers State.

Research Question Three:

What is the positive influence of Google on students' academic performance in public senior secondary schools in Port Harcourt City, Rivers State?

Table 3: Mean and standard deviation on the positive Influence of Google on the academic performance in public senior secondary schools in Port Harcourt City.

S/N	Items	Teachers		Students		Total Mean	Decision
		MEAN $\overline{X}$	**SD$_1$**	**MEAN** $\overline{X}$	**SD$_1$**		
11.	A lot of students use Google to engage in activities that are relevant to their academic progress.	3.29	0.54	2.95	0.49	3.12	Agreed
12.	Google assist in broadening students' knowledge on difficult subject matter	3.24	0.54	3.17	0.52	3.20	Agreed
13.	Google promotes interactive learning.	2.98	0.49	3.09	0.51	3.03	Agreed
14.	Google enables students to have access to numerous educational materials globally.	3.74	0.55	3.95	0.50	3.85	Agreed
15.	Google allows for easy download or storage of educational materials in different formats which can be studied in a future date to enhance academic performance.	3.89	0.54	3.90	0.51	3.90	Agreed
	Average Grand Total	**3.43**	**0.53**	**3.41**	**0.51**	**3.42**	**Agreed**

Source: Field Survey, 2024.

From the table 3, the items 11, 12, 13, 14, and 15 were all agreed upon by both teachers and students that Google has a positive influence on the academic performance of students in public senior secondary schools in Port Harcourt City. Precisely, the result shows that teachers and students both strongly agreed on the point that Google allows for easy download or storage of educational materials in different formats which can be studied in a future date to enhance academic performance which improves academic performance as indicated on item 15 with a total mean of 3.90. While item 13 although agreed upon had the lowest total mean score of 3.03 on the table on the issue Google promotes interactive learning. Thus, based on the highest average grand total scores rating, it is judged that Google has the most positive influence the academic achievement among public senior secondary school's students in Port Harcourt, Rivers State.

Discussion of Findings

In the preceding subhead, an effort was made to analyze the data collected via questionnaire and the results obtained from it quite revealed the position of findings. The research has three major objectives which were to; Investigate the positive effect of Youtube on the academic performance of students in public senior secondary schools in Port Harcourt, Rivers State, Determine the positive impact of WhatsApp on students' academic performance in public senior secondary schools in Port Harcourt, Rivers State, and ascertain the positive influence of Google on students' academic performance in public senior secondary schools in Port Harcourt, Rivers State (Eke,2018).

The finding of the study as it relates to the first research question, revealed that, YouTube has low positive influence the academic achievement of students in public senior secondary school in Port Harcourt, Rivers State. This was determined based on the low average grant total score rating of both sets of respondents (teachers and students). Furthermore, this affirms the general view point that YouTube is mostly used by students for entertainment purposes and rarely used for academic purposes. This doesn't not deny the fact that YouTube has numerous educational videos on various topics that would be of great value to students. However, these videos are rarely watched by students on YouTube because they are considered boring (Opara, 2018).

The findings of the study regarding the second research question indicates that WhatsApp although a messaging platform, has a strong impact on the academic performance of students. This is attested to by the relatively high positive response of teachers and students. This confirms the fact that WhatsApp is being used globally not just as messaging platform but also

a means of knowledge sharing and the sharing of information that helps to enhance the academic performance of students (Eke, 2018).

The finding from the third research question highlights the fact that Google plays a vital role in terms of influencing the academic performance of students positively in secondary schools in Port Harcourt, Rivers State. This is attested to by both sets of respondents with the highest average grand total mean rating compared to other social media platforms examined. This can be attributed to several factors including the fact that Google provide a high content of academic materials in different formats such as written, audio, video and pictures. These different formats enable students to select materials that are most suitable for what they are learning and studying. Additionally, the information provided via the Google platform are easily accessible, storable and printable making it possible for students to use at different intervals (Sam Jaja & Sam-Kalagbor, 2023).

Conclusion

This study investigated the influence of social media on the academic performance of students in public secondary schools in Port Harcourt, Rivers State. The findings revealed that social media has both positive and negative impacts on academic performance. However, Google was found to have a more positive influence on academic performance, as it provides students with access to a vast array of educational resources, facilitates research, and enhances understanding. WhatsApp followed, as it enables students to collaborate, share resources, and communicate with teachers and peers.

However, YouTube had a lower positive impact on academic performance. While it offers educational videos and tutorials, excessive YouTube use can lead to distractions, decreased attention span, and reduced critical thinking skills. Additionally, YouTube's passive nature can hinder deep learning and understanding. Overall, this study highlights the need for students to use social media responsibly and for educators to harness its potential to enhance academic performance. By promoting responsible social media use and leveraging its benefits, students can optimize their academic success.

Recommendations

Based on the above findings the following recommendations were proffered:

1) Teachers, educational administrators, and educational stakeholders should ensure the integration of Google's educational resources and tools into their teaching practices,

such as Google Classroom, Google Scholar, and Google Docs, to enhance student learning, collaboration, and academic performance.

2) Teachers and students should establish designated WhatsApp groups for academic purposes, setting clear guidelines and expectations for usage, to maximize collaboration, reduce distractions and improve academic performance.

3) Teachers should curate and share educational YouTube videos and channels, promoting critical thinking and active learning, while also teaching students to evaluate online sources and maintain a balance between YouTube use and traditional learning methods in order to improve academic performance.

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Revitalizing Education Management for Sustainable Development

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Abstract

Education has been identified as a critical agent in the development of a modern society because it plays a pivotal role in training and building human capacity for the nation. It is argued "as information grows exponentially, and its incorporation in the production process becomes increasing complex, the ability to absorb, and adapt new knowledge is determined by the nature, quality and quantity of the education system". This paper in a quest to examining the issues pertaining to the decay, finds poor funding, limited access to good education, obsolete curricula, brain drain, corruption, incessant University strikes, examination malpractice, inept leadership, and poor budgetary allocation to education as part of the problem. Findings show a positive relationship between education, health and economic growth. Therefore, except the system is revived and revamped, it will be a mirage for the country to catch up with the global competitiveness. As a way forward, Government must increase funding, tackle corruption and improve infrastructure. Excellence must be rewarded and indigenous R&D improved. They must stem the tide of brain drain by creating environment for good education.

Keywords: Education, Sustainable Development

Introduction

Education is said to be positively related to economic growth as the findings of (Afolabi and Loto, 2012) show in the case of Nigeria. Quality manpower therefore, is derived from standard education and it is the key for economic growth. Eboh and Uma 2009, Uma and Eboh, 2013 pointed out that the quality of manpower is a sine qua non for good governance. As information grows exponentially, and as its incorporation in the production process becomes increasingly complex, the ability to assimilate, acquire, adopt and adapt new knowledge becomes an important determinant of growth (Isola, 2002). Regrettably, the good thing (in terms of education) Nigerian inherited from the West has been allowed to decay because of many years of neglect.

Education seeks to develop the innate inner capacities of man. By educating an individual we attempt to give him some desirable knowledge, understanding, skills, interests, attitudes and critical thinking. As an individual in the society, he has to think critically about various issues in life and take decisions around them that is free from bias, prejudices, superstitions and blind beliefs. Thus, he has to learn all these qualities of head, hand and heart through the process of education. According to Aslanbek Naziew (2017), "Education is the socially organized and regulated process of continuous transference of socially significant experience from previous to following generations". The main process of obtaining education is to take a course of training in the system of educational institutions. In addition, Zewu Frank (2019), defined "Education as the experience gained after perennial process of learning that brings development to the life of the individual and the society". In whatever package it comes (casual, informal, non-formal or formal), education is a basic instrument of development and an important end in itself. This is so because education plays a key role in the ability of any developing country to absorb modern technology and to develop the capacity for self-sustaining growth and development (Todaro and Smith, 2009). In order words, education is the master key that unlocks a country' s potentials towards national transformation and sustainable national development (Ilechukwu, 2014).

Education for Sustainable Development from time immemorial, intellectuals have been very much concerned about the relationship between education and development. Indeed, political philosophers since the time of Plato and Aristotle have affirmed the dictums enunciated in the phrases, "As is the state, so is the school", "what you want in the state, you must put into the school" (Akinsanya, 2004). The truism that education is the surest way to sustainably develop any people or society needs no contention. Education, as earlier mentioned, is the process of imparting and acquiring knowledge, skills, attitudes, values and experiences in institutions of learning. The skills so acquired are subsequently applied to sustain present and future generation in everyday life. It is the proper nurturing, transmission and application of such skills and knowledge that guarantees development and sustenance of the society (Abiodun, 2002).

Education for Sustainable Development (ESD), which is sometime referred to as Sustainability Education is holistic and transformational education which addresses learning content and outcomes, pedagogy and the learning environment. It was a United Nations programmes that is defined as education that encourages changes in knowledge, skills, values and attitudes to enable a more sustainable and just society for all (United Nations Educational, scientific and

cultural-UNESCO, 2013). It achieves its purpose by transforming society. In addition, Education for Sustainable Development means including key sustainable development issues into teaching and learning; for example, climate change, disaster risk reduction, biodiversity, poverty reduction, and sustainable consumption, (UNESCO, 2014). It empowers learners to take informed decisions and responsible actions for environmental integrity, economic viability and a just society for present and future generations, while respecting cultural diversity. It is about lifelong learning, and is an integral part of quality education. Education for Sustainable Development is design at empowerment and equipment of current and future generations in order to meet their needs using a balanced and integrated approach to the economic, social and environmental dimensions of sustainable development. It is the term most used internationally and by the United Nations, (United Nations, 2017). Agenda 21 was the first international document that identified education as an essential tool for achieving sustainable development and highlighted areas of action for education, (Bernad-Cavero; Olga; Llevot-Calvet; Núria, 2018). In December 2002, the UN General Assembly adopted resolution 57/254 to put in place a United Nations Decade of Education for sustainable Development, spanning the years 2005 to 2014, with the United Nations Educational Scientific and Cultural Organization (UNESCO) as the lead agency for the Decade (Ilechukwu, 2014).

The Importance of Revitalizing Education for Sustainable Economic Development

Revitalizing education is an essential tool for achieving a more sustainable world. This was emphasised at the UN World Summit in Johannesburg in 2002 where the reorientation of current education systems was outlined as key to sustainable development. Education for sustainable development (ESD) promotes the development of the knowledge, skills, understanding, values and actions required to create a sustainable world, which ensures environmental protection and conservation, promotes social equity and encourages economic sustainability (United Nations, 2002) The graduates leaving universities now are entering a very different world from that encountered by their forebears, even a decade or so ago. It is pronounced by uncertainty, complexity and rapid change, manifested through a bewildering array of global issues relating to economic instability, climate change, inequity, loss of biodiversity, security challenge and migration, to mention a few, (Stephen Sterling, 2014). While sustainable development can be promoted through policy instruments, these tend to be effective for only as long as they are applied. Education can enhance the effectiveness of each of these instruments through developing informed engagement, agency and empowerment among all affected stakeholders. Education which is one of the principles for sustainable

economic and security development presupposes that the society needs educated and environmentally aware citizenry and workforce to help guide nations in the implementation of sustainable development goals.

Prospects of Revamping the System

At every stage in the development of a country, there are always challenges which, in a way help to bring new strategies for desired transformation. Nigeria as a developing country has such challenges that if properly tackled, will gradually reposition the educational standard in the polity. The following measures are worth considering in improving the standard.

i. Expansion of existing institutions of learning by providing relevant quality facilities that will improve the absorption of more students. Government must co-opt individual, philanthropist, industrialist, and private sectors to assist in funding and research as done in other countries. The rate of expansion in enrolment should match the rate of provision of facilities and human resources.

ii. Ethnicity, culture, and Religion must not be allowed to dictate the pace of education in Nigeria.

iii. Collaborative learning should be explored and encouraged. A situation where some schools could establish an understanding with foreign institutions to exchange ideas.

iv. The academia should lead the campaign for improved funding of the institutions through improved cost recovery and making the case for appropriate school fees. These are all within the purview of the academia and should constitute his role in reviving academic standards in our institutions of higher learning.

v. A Bridge from school to work: schools should have affiliated industries either privately or publicly owned so as to support practical training. This will go a long way to minimize 'paper certificate', and theoretical graduates who might not have seen any physical gadgets needed for processing raw materials or doing any work in their fields of training. It will enhance the bridge from school to work and reduce youth unemployment.

vi. Focus on moving education towards equipping students with skills that will lead to their path of employment.

vii. Manpower needs of the education system in Nigeria should be addressed. The methodology for handling children, teenagers and adults are not the same. This calls for training and retraining of teachers in educational institutions.

viii.   Visual aid teaching has almost gone in all facets of learning in Nigeria. It must be reintroduced from the pre-nursery to the tertiary institutions.

ix.   Reward system is discouraging. The teachers in schools are the least paid in the country. A local government councilor in Nigeria earns higher than a senior lecturer in the University. The annual income of a professor in Nigeria is less than the monthly income of a senator.

x.   Patronizer's of foreign education should pay tax on education. Whereas we do not advocate for the closing of window for educational tourism, yet the highly placed Nigerians, who prefer to send their children to advanced countries should be made to pay a form of high import of service duty.

xi.   Education environment, research grants security of life and property and other welfare packages need be addressed to minimize brain drain. A situation where a lecturer in the University takes home N68 (i.e. $0.34) as monthly hazard allowance is laughable.

xii.   Government must trim the bogus and jumbo pay of the politicians to be able to finance the education sector.

xiii.   Corruption must be tackled with every measure of sincerity or else nothing meaningful would be achieved.

Suggestions for Improvement

1)   Integrate education for sustainable development with special stress on economic and security development across the primary and secondary curriculum: It is important to fully integrate education for sustainable development in curricula across all subjects and within a clear framework.

2)   Present-day sustainable development education should focus on diversity of issues such as health, human rights, conflict resolution, security, ethics, gender, economic development, poverty alleviation, environmental sustainability etc.

3)   Provide professional training for administrators, teachers etc, to ensure education for sustainable economic and security development policy implementation.

4)   Education for Sustainable economic and security development issues/concepts should be taught formally and informally in ways that they become the core of people' s lives.

5)   Students, community members, professionals and practitioners should be encouraged to develop skills necessary for sustainable development.

6)   The revitalization of existing education at all levels to include principles, skills, perspectives and values of sustainable development.

7) School administrators should adopt education for sustainable development management practices with special emphasis on economic and security development, in order to complement and support the concept in the curriculum.

8) School administrators also need to adopt new management practices and structures, such as different time schedules in schools.

9) More research is needed to identify best practices.

Conclusion

Education for sustainable development is the process of achieving sustainable development, be it economic development, human development, security development and environmental protection and conservation. The concept of education for sustainable development, evolved largely from environmental education, which has sought to develop the knowledge, skills, values, attitudes and behaviours in people to care for their environment.

Sustainable development should be mainstreamed into all areas of education and training. In this regard administrators, teachers and trainers should be well equipped with the knowledge, skills and attitudes required for adequate education of the society. Revitalization of the education for sustainable economic and security development in this season of rapid Industrialisation cannot be underscore as it would lead to more awareness of the ecosystem by the citizenry.

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The Role of Education Law in Supporting Special Needs Students in Nigerian Tertiary Institutions

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Abstract

The role of education law in supporting special needs students in Nigerian tertiary institutions is pivotal to fostering an inclusive and equitable academic environment. Education law, comprising policies, regulations, and legal frameworks, is designed to protect the rights of students with disabilities, ensuring they have access to quality education without discrimination. In Nigerian tertiary institutions, the implementation of these laws has been inconsistent, leading to significant barriers for special needs students, such as inadequate accommodations, insufficient resources, and lack of institutional support. This paper examines the concept of education law, meaning of special needs, categorization of special needs and challenges faced by special needs students in Nigerian tertiary institutions, legal framework for special needs education in Nigeria, support systems mandated by education law for special needs students and gaps and barriers in education law enforcement. It was suggested that a system for continuous monitoring and evaluation of how institutions are supporting special needs students should be established. This system would help identify gaps in service delivery and ensure that legal requirements are being met.

Keywords: Role, Education, Law, Special Needs, Students, Tertiary Institutions

Introduction

Education is a powerful tool that drives individual empowerment, social development, and economic progress. It serves as the foundation for building knowledge, fostering critical thinking, and equipping individuals with the skills necessary to thrive in an increasingly complex world. Education not only prepares individuals for the workforce but also cultivates active citizenship and personal growth. Its impact extends beyond individual achievements, shaping communities and contributing to national development (Obasi & Agbaje 2023). It very often focuses on the development of one's skills to work effectively in various trades or professions. It also involves the development of one's mental capacity, moral development, and global understanding. It encompasses a broad spectrum of formal and informal processes aimed at facilitating learning, skill acquisition, and personal growth. As a concept, education is deeply

intertwined with legal frameworks, societal norms, and cultural practices, reflecting the values and aspirations of communities.

Education is a vital process that shapes individuals and societies by imparting knowledge, skills, and values. It serves as a foundation for personal development, social progress, and economic growth. However, the effectiveness of education as a tool for empowerment largely depends on the systems and structures that govern it. This is where education law plays a critical role. Education law provides the legal framework that regulates the operations of educational institutions, defines the rights and responsibilities of students and educators, and ensures equitable access to education for all members of society (Okafor and Ademola 2021). Adebayo and Eze (2023) referred education law as the body of laws, policies, and regulations that govern the functioning of educational institutions, including their administrative procedures, curriculum standards, and the rights and responsibilities of students and educators. This definition emphasizes education law as a framework for ensuring that educational systems operate efficiently, ethically, and in alignment with national standards.

Education law is integral to the functioning of educational systems as it provides the legal framework that ensures access to quality education, protects the rights of students and educators, and promotes equity and inclusion (Musa and Ibrahim 2023). The relevance of education law extends to multiple dimensions of education, including governance, curriculum standards, civil rights protections, and the provision of accommodations for students with special needs. It shapes how educational institutions operate and safeguard the fundamental right to education, as enshrined in national and international legal frameworks. Afolabi (2022) opined that education law plays a crucial role in ensuring that students with special needs receive equal access to education. It provides the legal framework that mandates educational institutions to accommodate these students, ensuring that they are not excluded or discriminated against based on their disabilities.

Special needs students are individuals who require additional support due to physical, sensory, cognitive, or developmental disabilities that affect their learning experiences (Afolabi 2022). These students often benefit from tailored educational services, assistive technologies, and modifications to the learning environment. Special needs students requiring additional educational assistance due to disabilities or other learning challenges, face numerous barriers in accessing quality education. These challenges range from physical accessibility issues to the lack of tailored educational resources and support services. Education law serves as a critical

framework for addressing these barriers, ensuring inclusivity, equity, and protection for all students.

Education law in Nigeria tertiary institutions ensures that these students have access to reasonable facilities such as adaptive learning materials, accessible infrastructure, and specialized support services to promote their academic success (Obi and Oladipo 2023). The relevance of education law in this context is paramount, as it ensures that special needs students are not marginalized within the academic system. By legally requiring tertiary institutions to provide inclusive education, laws such as the Disability Rights Act (2018) help foster a more equitable academic environment that benefits all learners. This legal framework is essential for protecting the rights of special needs students and promoting a culture of inclusion in higher education.

Special needs students have unique educational requirements of individuals with disabilities that impact their learning, such as physical impairments, cognitive disabilities, sensory disabilities (e.g., hearing or vision impairments), and developmental disorders. Education law in Nigeria aims to address these needs by creating an inclusive educational environment where all students can thrive regardless of their abilities. According to Umeh and Ibrahim (2023), despite the legal frameworks, there are many challenges facing the remain implementation of inclusive practices in Nigerian tertiary institutions. Limited resources, inadequate teacher training in special education, and inconsistent enforcement of the law often hinder the full realization of these legal protections. Strengthening the enforcement of education law and enhancing the capacity of tertiary institutions to support special needs students are essential steps in advancing educational equity.

Concept of Education Law

Education law refers to the body of legal rules and principles that govern the operation and management of educational institutions. It encompasses the statutes, regulations, and case law that outline the rights and responsibilities of students, teachers, and educational institutions. This legal framework ensures that educational practices are consistent with national and international standards, providing a structured approach to addressing issues such as curriculum standards, teacher qualifications, and student rights (Williams 2023). Smith and Jones (2023) considered education law as a tool for protecting the educational rights of individuals, ensuring equitable access to education and safeguarding against discrimination. This definition emphasizes the role of legal provisions in addressing issues related to special needs, gender

equality, and non-discrimination, promoting an inclusive educational environment where all individuals have the opportunity to succeed regardless of their background or abilities.

Education law governs the operation of educational institutions within a country, including both public and private entities. This area of law addresses all facets of the educational system, from the management of school resources and funding to the qualifications and job security of teachers and staff (Federal Ministry of Education, 2013). Education law establishes the standards that educational institutions must meet, including the criteria for hiring and terminating staff members. Education is primarily a governmental function managed through public school systems by the Ministry of Education. However, individual states also hold the main responsibility for operating and maintaining public schools in their states. According to the Universities Miscellaneous Provisions (Amendment) Act (2003), each state constitution mandates the establishment of a school system to ensure educational access for children. State legislatures hold authority over school systems, often delegating this power to state boards of education.

Education law is crucial for driving educational reform, influencing how schools operate, and enhancing the quality of educational services. These laws encourage institutions to become more accountable and responsible, pushing them to meet higher standards akin to those in other sectors. By doing so, education laws foster greater accountability and promote improvements in educational practices and administration.

Meaning of Special Needs

Special needs refer to a range of conditions that affect an individual's ability to participate fully in educational, social, and daily activities (Smith & Jones 2023). These needs can arise from physical, cognitive, sensory, emotional, or developmental challenges, each requiring specific types of support and accommodations. Special needs are defined as specific educational requirements that arise due to disabilities or impairments affecting a student's learning process. These needs necessitate specialized teaching strategies, accommodations, and support services to ensure that students can access and benefit from the educational curriculum. The focus is on adapting educational practices to address and support the diverse learning needs of students (Lewis and Walker 2023). This broad term encompasses various categories including physical, cognitive, sensory, emotional, and developmental challenges that necessitate specific support, accommodations, and tailored interventions to facilitate optimal participation and achievement.

Understanding special needs is essential for creating inclusive environments that ensure all individuals can access and benefit from opportunities without discrimination or barriers.

Categorization of Special Needs

Special needs encompass a diverse range of conditions that can be broadly categorized into five major areas: physical, cognitive, sensory, emotional and behavioral, and developmental. Each category represents different types of challenges that individuals face, often requiring specific educational and support strategies to ensure equitable access to opportunities and learning experiences. Adesina and Akinyemi (2022) categorized special needs students into:

1. Physical disabilities: Physical disabilities include conditions that impact an individual's mobility or physical function, such as paralysis, muscular dystrophy, cerebral palsy, or chronic illnesses. Examples include wheelchair dependency, limited motor skills, chronic pain.

2. Cognitive disabilities: Cognitive disabilities refer to impairments that affect intellectual functioning and learning processes. These include intellectual disabilities (e.g., Down syndrome) and learning disabilities (e.g., dyslexia, dyscalculia). Examples include difficulty with reading, writing, problem-solving, or understanding complex concepts.

3. Sensory disabilities: Sensory disabilities affect one or more of the senses, such as vision or hearing. Individuals with sensory disabilities may have difficulties processing sensory information, requiring specific accommodations to support their learning. Examples include blindness, low vision, deafness, partial hearing loss.

4. Emotional and behavioral disorders: Emotional and behavioral disorders include conditions that affect a person's emotional regulation and behavior, impacting their ability to engage in learning and maintain relationships within the educational setting. Examples include anxiety disorders, depression, conduct disorders, and mood swings.

5. Developmental disorders: Developmental disorders encompass conditions that affect the acquisition of developmental milestones. These disorders, such as autism spectrum disorders (ASD) and developmental delays, impact social, communication, and cognitive skills. Examples include delayed speech, difficulty in social interactions, repetitive behaviors.

Challenges faced by Special Needs Students in Nigerian Tertiary Institutions

Special needs students in Nigerian tertiary institutions face numerous challenges that impede their ability to fully participate in academic life. These challenges range from inadequate

infrastructure and limited access to learning materials to social stigma and insufficient support systems. Addressing these challenges is crucial for fostering an inclusive and equitable education system in Nigeria.

1. Inadequate infrastructure and accessibility: A major challenge faced by special needs students in Nigerian tertiary institutions is the lack of accessible infrastructure. Many campuses are not designed to accommodate students with physical disabilities, with the absence of ramps, elevators, and accessible restrooms. This lack of physical accessibility makes it difficult for students with mobility impairments to navigate campus facilities. Additionally, learning materials are often not available in formats accessible to students with sensory disabilities, such as braille for visually impaired students or captioning for hearing-impaired students. These barriers significantly hinder the academic success of students with special needs (Adesina & Akinyemi 2022).

2. Insufficient specialized personnel: Another critical challenge is the shortage of specialized personnel trained to work with students with special needs. Most Nigerian tertiary institutions lack adequately trained staff, such as special education teachers, counselors, or therapists, who can provide the necessary support to students with disabilities (Lewis & Walker 2023). This results in a situation where students are unable to receive individualized attention or the specialized interventions they require to succeed academically.

3. Social stigma and discrimination: Special needs students also face significant social challenges, including stigma and discrimination from both peers and faculty members. Negative attitudes towards disabilities often lead to exclusion from academic and social activities, making it harder for students to integrate into the campus community. This social isolation can exacerbate feelings of marginalization and reduce students' motivation to continue their education (Thompson & Murphy 2023).

4. Lack of inclusive policies and legal frameworks: Although Nigeria has made some progress in enacting laws to protect the rights of individuals with disabilities, many tertiary institutions have yet to fully implement these policies. The lack of enforcement of inclusive education policies, coupled with the absence of clear guidelines for accommodating special needs students, creates an environment where students do not receive the legal protections and support they are entitled to.

Legal Framework for Special Needs Education in Nigeria

The legal framework for special needs education in Nigeria is designed to protect the rights of individuals with disabilities and ensure their access to education in an inclusive environment. Over the years, Nigeria has enacted various laws and policies aimed at promoting the inclusion of special need students in educational institutions. Despite these efforts, challenges persist in implementing these frameworks effectively, particularly in tertiary institutions. The following legal frameworks are operational in Nigeria;

Discrimination Against Persons with Disabilities (Prohibition) Act, 2018

One of the primary legal instruments governing special needs education in Nigeria is the Discrimination Against Persons with Disabilities (Prohibition) Act, 2018. This act prohibits discrimination against individuals with disabilities in both public and private sectors, including education. The law mandates that educational institutions make provisions for the accessibility of students with disabilities, such as creating inclusive environments and providing necessary accommodations like assistive devices and tailored learning materials (Federal Republic of Nigeria. (2018).

National Policy on Education (2013)

The National Policy on Education (2013) include provisions for special needs education, emphasizing the right to equal educational opportunities for all Nigerian children, irrespective of their physical or mental condition. It mandates that schools, including tertiary institutions, implement policies and programs that cater to the educational needs of students with disabilities. The policy also advocates for the training of special education teachers and the development of specialized learning materials (Federal Ministry of Education. (2013).

Child Rights Act, 2003

The Child Rights Act, 2003 provided a legal basis for the protection of children's rights, including the right to education. For children with special needs, the act emphasizes their entitlement to specialized services and support to facilitate their educational development. This includes the provision of inclusive educational settings where students with disabilities can learn alongside their peers without disabilities (National Assembly of Nigeria. (2003).

The Universal Basic Education (UBE) Act, 2004

The Universal Basic Education (UBE) Act, 2004 mandated free and compulsory education for all children in Nigeria, including those with special needs. Although this law primarily focuses

on basic education, it has laid the groundwork for inclusive educational practices that can be extended into tertiary education. The act also highlights the need for educational institutions to provide the necessary infrastructure and resources for students with disabilities (Federal Republic of Nigeria. (2004).

The legal framework for special needs education in Nigeria is robust with several laws and policies aimed at promoting the inclusion and protection of students with disabilities. Ensuring that these legal provisions translate into tangible benefits for special needs students requires concerted efforts from the government, educational institutions, and civil society. Key legal frameworks like the Discrimination Against Persons with Disabilities (Prohibition) Act, 2018 and the National Policy on Education (2013) mandated institutions to provide accessible facilities and specialized learning materials for students with disabilities. However, many institutions struggle to fully adhere to these requirements, citing financial and logistical barriers. For instance, the majority of Nigerian universities and colleges are not fully equipped with ramps, elevators, or specialized classrooms that are necessary to accommodate students with physical disabilities. Additionally, the provision of learning aids such as braille materials and assistive technologies is often inadequate, leaving students with special needs at a significant disadvantage.

The Role of Education Laws on Special Needs Students

Education law mandates various support systems to ensure that students with special needs receive equitable access to education and are provided with the necessary accommodations to thrive academically and socially. In Nigeria, laws such as the Discrimination Against Persons with Disabilities (Prohibition) Act, 2018 and policies like the National Policy on Education (2013) emphasize the importance of creating an inclusive educational environment for special needs students. These laws and policies outline specific support systems that institutions must implement to guarantee accessibility and inclusivity among which are:

i. Inclusive Infrastructure

One of the primary support systems mandated by education law is the development of inclusive infrastructure. This includes physical adjustments such as ramps, elevators, and accessible classrooms that enable students with physical disabilities to navigate the campus safely and efficiently. The Discrimination Against Persons with Disabilities (Prohibition) Act, 2018 explicitly mandates that all public buildings, including educational institutions, must be accessible to persons with disabilities. As reported in Federal Republic of Nigeria (2018) these

infrastructural modifications are essential to ensuring that students with mobility challenges can attend classes, access facilities such as libraries and laboratories, and participate in extracurricular activities without barriers.

ii. Assistive Technology and Learning Materials

The provision of assistive technologies and specialized learning materials is another critical support system mandated by education law. These resources include screen readers, braille machines, hearing aids, and software that facilitate communication and learning for students with visual, auditory, or cognitive disabilities. The National Policy on Education (2013) encourages institutions to provide these technologies to enhance the learning experiences of students with special needs. The use of assistive technologies is particularly vital in enabling students with disabilities to engage fully with the curriculum and perform at par with their peers. Without these accommodations, students with special needs may be unable to participate effectively in academic activities, leading to inequitable educational outcomes (Lewis and Walker 2023)

iii. Specialized Personnel

The law also mandates the recruitment and training of specialized personnel, such as special education teachers, counselors, and therapists, who are essential for supporting students with disabilities. These professionals are trained to address the unique needs of special needs students, providing individualized instruction, emotional support, and therapy where necessary. The National Policy on Education (2013) emphasized the importance of having trained professionals who can deliver inclusive education and facilitate the integration of students with disabilities into mainstream academic settings. For effective implementation, institutions must invest in the recruitment of qualified special education staff and provide continuous professional development to ensure they are updated on best practices for inclusive education (Evans and Carter 2022).

iv. Individualized Education Programs

Another key support system is the development and implementation of individualized education programs. An individualized education programs is a personalized plan tailored to the specific educational needs of a student with disabilities. It outlines the accommodations, modifications, and specialized services that the student requires to succeed in an academic environment. Though not yet widely implemented in Nigeria, the adoption of individualized education programs has been encouraged by the Discrimination Against Persons with

Disabilities (Prohibition) Act, 2018 and other related policies. Individualized education programs are critical for ensuring that the unique challenges faced by students with disabilities are addressed systematically, allowing them to achieve their full academic potential.

v. Counseling and Psychological Services

Tertiary institutions are also required to provide counseling and psychological services to support the emotional and mental well-being of students with special needs. These services are essential, as students with disabilities often face challenges such as discrimination, social isolation, and academic pressure, which can negatively impact their mental health. Counseling services are designed to help students cope with these challenges and provide a safe space where they can seek advice and support. Educational institutions must ensure that these services are accessible and tailored to meet the specific needs of students with disabilities, thereby promoting their holistic development (Evans and Carter 2022).

vi. Accessible Examination and Assessment Procedures

Education law also mandates the adaptation of examination and assessment procedures to accommodate students with special needs. This includes offering alternative assessment formats, such as oral exams or extended time for written exams, to ensure that students with disabilities are not disadvantaged (Federal Republic of Nigeria 2018). The goal is to provide an equitable evaluation process that considers the unique challenges faced by special needs students. Institutions must develop and implement policies that make examination and assessment procedures accessible, ensuring that all students have a fair chance to demonstrate their knowledge and skills.

Despite the legal frameworks in place, the successful implementation of these support systems requires ongoing investment, awareness, and a commitment from all stakeholders within the education sector. By adhering to these mandates, Nigerian tertiary institutions can better serve students with disabilities and uphold their legal and moral obligations to provide an inclusive educational environment.

Gaps and Barriers in Education Law Enforcement

The fact that education law plays a vital role in ensuring equitable access to education, particularly for special needs students, significant gaps and barriers in its enforcement persist, especially in Nigerian tertiary institutions. These challenges can undermine the effectiveness of the laws intended to create inclusive educational environments, leaving many students underserved. The following highlights the primary gaps and barriers in the enforcement of education law, drawing on recent research and case studies.

1. Lack of Adequate Funding

One of the most critical gaps in education law enforcement is the insufficient allocation of resources. Many tertiary institutions in Nigeria struggle with funding constraints that limit their ability to implement inclusive education policies effectively. Despite legal mandates such as the Discrimination Against Persons with Disabilities (Prohibition) Act, 2018, financial shortfalls hinder the development of necessary infrastructure, the purchase of assistive technologies, and the hiring of specialized personnel. The lack of financial support from the government and limited budgetary allocations within institutions themselves create a significant barrier to fulfilling legal obligations. For example, while the law mandates accessible infrastructure, many institutions still have poorly designed buildings that do not accommodate students with physical disabilities (Adesina and Akinyemi 2022).

2. Inadequate Awareness and Training

A lack of awareness and insufficient training among educators and administrative staff is another significant barrier to effective law enforcement. Many faculty members are unaware of the legal rights of special needs students, while others lack the skills to accommodate these students in their teaching and assessment practices. This gap in knowledge often results in the inadequate implementation of education law and neglect of the specific needs of students with disabilities. According to Evans and Carter (2022) to bridge this gap, institutions must invest in training programs that equip educators with the necessary skills to support special needs students and comply with education laws. However, due to budget constraints and institutional inertia, such training programs are often underdeveloped or absent in many Nigerian tertiary institutions.

3. Weak Enforcement Mechanisms

Weak enforcement mechanisms contribute significantly to the gaps in education law compliance. Even though laws like the Discrimination Against Persons with Disabilities (Prohibition) Act, 2018 and the National Policy on Education (2013) provide a framework for

inclusive education, there is often little to no follow-through in monitoring and ensuring that institutions comply with these mandates. The absence of robust accountability measures allows institutions to bypass legal requirements without facing consequences. Regulatory bodies such as the National Universities Commission (NUC) and other government agencies are tasked with overseeing the implementation of education law. However, these agencies are often under-resourced and unable to effectively monitor all tertiary institutions across the country. This lack of consistent oversight allows institutions to delay or neglect the adoption of necessary policies and accommodations for special needs students.

4.   Cultural and Societal Attitudes

Cultural and societal attitudes toward disability can also act as barriers to the enforcement of education law. In many communities, there is a lack of understanding or acceptance of disabilities, which can lead to discrimination and stigmatization of students with special needs. This societal mindset often infiltrates the educational system, affecting how institutions prioritize or neglect inclusive education. Even with legal protections in place, the absence of a widespread cultural shift toward inclusivity and understanding limits the effectiveness of education law. Changing these attitudes requires more than legal mandates; it demands concerted efforts to raise awareness and promote inclusivity within society at large, which has been slow to materialize in many parts of Nigeria (Ojo and Ibrahim 2021).

5.   Ineffective Grievance Redress Systems

Another gap in the enforcement of education law is the ineffectiveness of grievance redress systems for students with disabilities. Many institutions lack clear channels through which special needs students can report violations of their rights or seek redress for discriminatory practices (Lewis and Walker 2023). This absence of a functional grievance mechanism disempowers students and allows institutions to avoid accountability. While laws may mandate the creation of grievance procedures, in practice, many students with disabilities are unaware of their rights or face obstacles when attempting to access support. Without effective grievance systems, students are left vulnerable to neglect, discrimination, and violations of their legal rights.

Conclusion

The role of education law in supporting special needs students in Nigerian tertiary institutions is crucial for ensuring an inclusive educational environment. While existing laws provide a foundation for the protection of these students' rights, their inconsistent implementation limits

their effectiveness. Through targeted reforms, including enhanced law enforcement, dedicated support services, staff training, and collaboration with stakeholders, Nigerian tertiary institutions can create an academic space that caters to the diverse needs of all students. This will not only improve educational outcomes for special needs students but also align Nigeria's education system with international standards of inclusivity and equity.

Suggestions

The following suggestions were made:

1.   Nigerian tertiary institutions should prioritize the full implementation of the Nigerian Disability Act and other relevant legislation. Clear guidelines for enforcement should be developed, with penalties for non-compliance to ensure accountability at institutional levels.

2.   Institutions should create dedicated units responsible for providing comprehensive support to special needs students. These units should offer tailored services such as assistive technology, counseling, and academic accommodations to enhance student success.

3.   The Nigerian government and educational institutions should allocate sufficient resources to ensure that special needs students have access to appropriate learning materials, assistive devices, and infrastructural modifications necessary for equal participation in academic activities.

4.   A system for continuous monitoring and evaluation of how institutions are supporting special needs students should be established. This system would help identify gaps in service delivery and ensure that legal requirements are being met.

5.   Periodic reviews and updates of education laws are necessary to address the evolving challenges faced by special needs students. This includes incorporating provisions for emerging issues such as digital accessibility and remote learning.

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Application of Artificial Intelligence in Teaching and Research for Educational Goals Attainment in Public Universities in Rivers State

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Abstract

The study examined Application of Artificial Intelligence in Teaching and Research for Educational Goals attainment in Public Universities in Rivers State. Two research questions and two hypotheses were drawn. The study adopted a descriptive survey design with a population of 12,543 lecturers and students, comprising 3,762 lecturers and 8,780 students in public universities in Rivers State, which include University of Port Harcourt, Rivers State University and Ignatius Ajuru University. Taro Yamane formular was used to determine the sample size used for the study 373 respondents comprising of 110 lecturers and 263 students. The instrument used for data collection was a structured questionnaire titled "Application of Artificial Intelligence in Teaching and Research for Educational Goals attainment in Public Universities in Rivers State Questionnaire". The instrument was validated by two experts in the field of Measurement and Evaluation in Rivers State University. The reliability of the instrument was determined using Cronbach Alpha method. A cumulative reliability index of 0.89 was obtained. The mean and standard deviation statistics were used to answer the research questions. The findings of the study revealed that, the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities and the use of AI enhances the conduct of research towards Educational Goals attainment in Public Universities. Based on the findings of the study, it was recommended among others that, to fully harness the potential of AI, university administrators should implement regular training programs for faculty members to enhance their knowledge and skills in using AI technologies. This will ensure that lecturers are capable of integrating AI-based teaching methodologies and tools into their curricula, as well as conducting AI-driven research.

Keywords: Artificial Intelligence, Education Goals, Lecturers, Students, Teaching and Research, Universities.

Introduction

The advent of Artificial Intelligence (AI) has revolutionized various sectors globally, and education is no exception. In public universities, particularly in Rivers State, Nigeria, the integration of AI in teaching and research has the potential to enhance educational goals and improve academic outcomes. AI technologies are rapidly transforming the traditional educational landscape, offering innovative solutions for personalized learning, efficient

research methods, and improved administrative processes. As public universities strive to meet the increasing demand for quality education, AI has emerged as a key enabler in achieving these goals (Ogunode, & Gregory, 2023). This introduction aims to explore the applications of AI in teaching and research within the context of Rivers State's public universities, with a focus on how AI can contribute to educational development and goal attainment.

Artificial Intelligence (AI) in the context of teaching and research refers to the integration of intelligent systems, tools, and algorithms to enhance educational practices, facilitate learning, and support academic research in public universities (Ogunode, Agbade, & Bassey, 2023). AI technologies such as machine learning, natural language processing, and data analytics are utilized to optimize teaching methodologies, personalize learning experiences, and accelerate scholarly research. These AI-driven innovations are designed to address educational challenges, improve student outcomes, and contribute to the achievement of institutional educational goals.

In teaching, AI enables the creation of adaptive learning systems that tailor content and instructional strategies to meet individual student needs. For example, AI can analyze students' learning patterns, predict academic challenges, and offer personalized interventions, such as intelligent tutoring systems or recommendation engines that suggest relevant learning resources (Zawacki-Richter et al., 2019). AI-powered platforms can also automate administrative tasks, such as grading and providing feedback, allowing instructors to focus more on interactive and engaging aspects of teaching (Holmes et al., 2019).

AI's role in research is equally transformative. It enables researchers to process and analyze vast amounts of data, which can uncover new insights, improve decision-making, and streamline research workflows. In public universities, AI technologies are being utilized to support fields such as computational biology, social sciences, and engineering, accelerating discoveries and improving research quality. For instance, AI can automate data analysis in large-scale studies, thus significantly reducing the time and resources required to derive meaningful conclusions. Additionally, AI aids in the development of sophisticated models and simulations, which are crucial in fields such as climate change research, medical diagnostics, and policy analysis (Sarma et al., 2020).

The adoption of AI in public universities further supports institutional educational goals by fostering greater accessibility, inclusivity, and equity in learning. AI can provide real-time support to students with disabilities through tools like voice recognition, text-to-speech, and

visual recognition systems. Moreover, AI-powered platforms can ensure that learning content is accessible to students from diverse linguistic and cultural backgrounds, promoting a more globalized educational experience (Woolf et al., 2021).

AI can enhance teaching by providing personalized learning experiences, catering to the diverse needs of students. Machine learning algorithms, natural language processing, and intelligent tutoring systems can analyze students' learning patterns and adapt content to their individual pace and level of understanding. For instance, platforms like chatbots can answer student queries promptly, while AI-driven systems like adaptive learning platforms can create customized lessons, making learning more interactive and engaging (Li, 2023). These technologies can especially benefit students in Rivers State's public universities by addressing the challenges of overcrowded classrooms and limited access to quality instructional materials. Personalized learning has been shown to improve student engagement, retention, and academic performance, aligning with the educational goals of improving student outcomes and reducing dropout rates (Adedoyin & Soykan, 2020).

In addition to teaching, AI plays a crucial role in research, facilitating data analysis, discovery, and innovation. AI-powered tools such as machine learning models, predictive analytics, and data mining techniques enable researchers to process large datasets quickly, uncover hidden patterns, and make data-driven predictions. In the context of public universities in Rivers State, where access to research funding and resources may be limited, AI can help optimize research productivity by automating repetitive tasks and enhancing collaboration. AI-driven research tools can also assist in academic writing, citation management, and even identifying gaps in existing literature, streamlining the research process (Elakkiya, 2021). Moreover, AI technologies can bridge the gap between theoretical knowledge and practical applications by fostering interdisciplinary research, which is essential for addressing real-world problems in the local and global contexts.

Furthermore, AI can improve administrative processes in public universities by automating routine tasks such as admissions, scheduling, grading, and student support services. This leads to a more efficient use of resources and a more effective learning environment. AI-based analytics can also provide insights into institutional performance, helping university administrators to make informed decisions about resource allocation and policy formulation. With the growing demand for higher education in Rivers State, these improvements can help

universities manage increasing student populations and enhance the overall quality of education (Akpan, 2022).

The application of AI in public universities in Rivers State holds significant promise for achieving educational goals. By enhancing teaching methods, improving research capabilities, and streamlining administrative functions, AI can help address the challenges faced by these institutions, contributing to the attainment of educational goals such as improved access, quality, and relevance of education. However, while AI promises significant improvements in education and research, it also raises critical issues around ethics, data privacy, and the potential for exacerbating inequality. Therefore, its implementation must be carefully managed, ensuring that AI systems are transparent, fair, and accountable (Binns, 2018). Public universities must navigate these challenges by establishing appropriate governance frameworks and ensuring that AI's benefits are equitably distributed across all academic disciplines and student populations. However, successful implementation requires strategic planning, investment in infrastructure, and training for both educators and students to fully harness the potential of AI technologies.

Statement of the Problem

The application of Artificial Intelligence (AI) in teaching and research holds significant potential to transform educational practices and academic inquiry in public universities. However, several challenges hinder the effective integration of AI in achieving educational goals. These challenges encompass technical, ethical, and institutional issues that require careful consideration and mitigation strategies. One of the primary challenges in applying AI in public universities is ensuring data privacy and security. AI systems rely on large amounts of student data, such as learning behaviours, academic performance, and personal information, to deliver personalized learning experiences and insights for research. However, this data can be vulnerable to breaches, misuse, or unethical handling, posing significant risks to students' and researchers' privacy (Pardo & Siemens, 2014). In many jurisdictions, including public universities, stringent data protection regulations such as the General Data Protection Regulation (GDPR) must be adhered to, making it difficult to balance the need for data access with privacy concerns (Binns, 2018).

Another major challenge is the risk of bias and inequity inherent in AI algorithms. AI systems are often trained on historical data, which can perpetuate existing biases related to gender, race, socio-economic status, and other factors. In an educational setting, this can lead to discriminatory outcomes, where certain groups of students may not receive the same level of

support or access to opportunities. For instance, an AI algorithm designed to predict student success might disproportionately disadvantage students from marginalized communities if the training data reflects societal inequalities (O'Neil, 2016). Ensuring fairness and mitigating bias in AI systems is a critical challenge for public universities to address, requiring careful scrutiny of the data used and the algorithms developed. The effective implementation of AI in universities requires substantial technological infrastructure and expertise. Many public universities, especially those in developing regions or with limited funding, may lack the necessary resources to support sophisticated AI systems. This includes hardware like high-performance computing resources and the software platforms needed to run AI applications. Additionally, there is a shortage of faculty members and technical staff with the expertise to develop, implement, and maintain AI-based solutions (Brynjolfsson & McAfee, 2017). Without these resources and skilled personnel, universities may struggle to deploy AI applications effectively for teaching and research.

The introduction of AI in public universities can encounter resistance from faculty, administrators, and students who may feel threatened by the technological shift or be skeptical about its efficacy. Educators may worry that AI could undermine their role or lead to job displacement, while students may have concerns about the quality of AI-driven instruction compared to traditional face-to-face teaching. Moreover, some academic staff may lack the training to integrate AI into their teaching practices or research methodologies (Sternberg, 2020). Addressing these concerns requires comprehensive professional development programs, clear communication about AI's role, and a strategic approach to change management. It is for these reasons and more, that the research investigated; What are the application of Artificial Intelligence in Teaching and Research for Educational Goals attainment in Public Universities? and to proffer solution the problems.

Purpose of the Study

Generally, the study investigated Application of Artificial Intelligence in Teaching and Research for Educational Goals attainment in Public Universities in Rivers State. Specifically, the objectives of the study are to:

1. Investigate the extent the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities in Rivers State.

2. Determine the extent the use of AI enhance the conduct of research towards Educational Goals attainment in Public Universities in Rivers State.

Research Questions

The study was guided by the following research questions:

1. To what extent does the use of AI applications influence teaching and research for Educational Goals attainment in Public Universities in Rivers State?

2. To what extent does the use of AI enhance the conduct of research towards Educational Goals attainment in Public Universities in Rivers State?

Hypotheses

The study was guided by the following null hypotheses at 0.05 level of significance.

1. There is no significant difference between the mean opinion scores of lecturers and students on the extent the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities in Rivers State.

2. There is no significant difference between the mean opinion scores of lecturers and students on the extent the use of AI enhances the conduct of research towards Educational Goals attainment in Public Universities in Rivers State.

Methodology

The study adopted a descriptive survey design. The population stood at 12,543 which comprised of 3,762 lecturers and 8,780 students across public universities in Rivers State, which include University of Port Harcourt, Rivers State University and Ignatius Ajuru University. The sample size which stood at 388 respondents, comprising 116 lecturers and 272 students in public universities in Rivers State, was determined using Taro Yamen formula. The instrument for data collection was a self-structured questionnaire titled: "Application of Artificial Intelligence in Teaching and Research for Educational Goals attainment in Public Universities Questionnaire". The questionnaire consisted of two sections namely section A and B. Section A of the questionnaire was used to generate demographic information while section B consisted of questionnaire items addressing the research questions of the study. This section of the questionnaire was structured using a four-point summated rating response scale of: Very High Extent (VHE) = 4 points, High Extent (HE) = 3 points, Low Extent (LE) = 2 points, Very Low Extent (VLE) = 1 point. The instrument was subjected to face and content validity by two experts in the field of Measurement and Evaluation in Rivers State University. The reliability of the instrument was established using a pilot study. The instrument was retrieved and analyzed with Cronbach Alpha method to establish the overall reliability index of 0.89. Out of the 388 copies of the questionnaire administered, 373 copies were retrieved and were properly filled,

comprising 110 lecturers and 263 students in public universities in Rivers State used for the study. Mean and standard deviation statistics were used to answer the research questions, while z-test statistics was used to test the null hypotheses at 0.05 alpha level of significance.

Result Presentation

RQ. 1: To what extent does the use of AI applications influence teaching and research for Educational Goals attainment in Public Universities in Rivers State?

Table 1: Mean Ratings of Respondents on the Extent the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities in Rivers State

S/N	Items	Lecturers N= 110		Students N=263				
		$\bar{X}_1$	Std_1	$\bar{X}_2$	Std_2	Average mean	Std	RMK
1.	AI tools can analyse large volumes of academic data to identify trends and areas that need improvement.	3.70	0.88	3.75	0.84	3.73	0.86	HE
2.	By reducing the workload of educators and administrative staff, AI allows more time to focus on research, teaching, and student interaction, enhancing the quality of education and academic goals.	4.35	1.16	4.41	1.11	4.38	1.14	VHE
3.	AI can significantly enhance research by assisting in data collection, analysis, and interpretation.	3.68	1.61	3.74	1.48	3.71	1.54	HE
4.	AI enables the creation of virtual labs and simulations, providing students with hands-on experience in fields like science, engineering, and medicine, without the need for physical equipment.	3.57	0.93	3.63	0.90	3.60	0.92	HE
5.	AI can connect experts, suggest potential collaborators, and organize research networks, which is crucial for achieving research and educational goals.	3.72	0.85	3.77	0.82	3.75	0.83	HE
	Aggregate Mean/SD for Lecturers and Students	**3.80**	**1.17**	**3.86**	**1.03**	**4.56**	**1.06**	**VHE**

Source: Field Survey, 2024.

Table 1 in response to research question 1 which states, to what extent does the use of AI applications influence teaching and research for Educational Goals attainment in Public Universities in Rivers State had the following opinion scores for both lecturers and students. Mean scores of the lecturers to questionnaire items 1, 2, 3, 4 and 5 were 3.70, 4.35, 3.68, 3.57 and 3.72 with standard deviations of 0.88, 1.16, 1.61, 0.93 and 0.85 while the mean scores of the students were 3.75, 4.41, 3.74, 3.63 and 3.77 with standard deviation of 0.84, 1.11, 1.48,

0.90 and 0.82. Furthermore, the mean set representing the average mean scores for both lecturers and students were 3.73, 4.38, 3.71, 3.60 and 3.75; with standard deviation of 0.86, 1.14, 1.54, 0.92 and 0.83 respectively. The readings which were higher than the criterion mean of 3.00 indicated that the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities in Rivers State to a high extent.

RQ2: To what extent does the use of AI enhance the conduct of research towards Educational Goals attainment in Public Universities in Rivers State?

Table 2: Mean Ratings of Respondents on the Extent the use of AI enhances the conduct of research towards Educational Goals attainment in Public Universities in Rivers State

S/N	Questionnaire Items	Lecturers N= 110		Students N=263				
		$\bar{X}_1$	Std$_1$	$\bar{X}_2$	Std$_2$	Average mean	Std	RMK
6.	Researchers can use AI tools to analyse trends in student performance, attendance, and engagement, allowing universities to tailor interventions to improve learning outcomes.	3.65	0.89	3.69	0.87	3.67	0.88	HE
7.	AI can create personalized learning paths for students based on their unique needs, learning styles, and progress.	4.19	1.33	4.20	1.29	4.19	1.31	HE
8.	AI can support curriculum development by identifying emerging trends in education and suggesting new teaching methods, materials, and resources.	3.00	0.68	3.02	0.67	3.01	0.68	HE
9.	AI can provide intelligent tutoring systems, virtual teaching assistants, and automated feedback systems, which can supplement traditional classroom teaching.	3.07	0.78	3.09	0.78	3.08	0.79	HE
10.	AI can enhance the accessibility of educational resources by organizing and recommending relevant academic articles, journals, and other materials based on researchers' needs.	3.00	0.75	3.03	0.74	3.02	0.75	HE
	Aggregate Mean/SD for Lecturers and Students	**3.38**	**0.89**	**3.41**	**0.87**	**3.39**	**0.88**	**HE**

Source: Field Survey, 2024.

Table 2 in response to research question 2 which states, to what extent does the use of AI enhance the conduct of research towards Educational Goals attainment in Public Universities in Rivers State had the following opinion scores for both lecturers and students. Mean scores of the lecturers to questionnaire items 11, 12, 13, 14 and 15 were 3.65, 4.19, 3.00, 3.07 and 3.00 with standard deviations of 0.89, 1.33, 0.68, 0.78 and 0.75 while the mean scores of the students

were 3.69, 4.20, 3.02, 3.09 and 3.03 with standard deviation of 0.87, 1.29, 0.67, 0.78 and 0.74. Furthermore, the mean set representing the average mean scores for both lecturers and students were 3.67, 4.19, 3.01, 3.08 and 3.02; with standard deviation of 0.88, 1.31, 0.68, 0.79 and 0.75 respectively. The readings which were higher than the criterion mean of 3.00 indicated that the use of AI enhance the conduct of research towards Educational Goals attainment in Public Universities in Rivers State to a high extent.

Hypotheses Testing

1. There is no significant difference between the mean opinion scores of lecturers and students on the extent the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities in Rivers State.

Table 3: Z-test Analysis on the Extent the Use of AI applications influences teaching and research for Educational Goals attainment in Public Universities in Rivers State.

Respondents	N	$\bar{x}$	Std	DF	z-cal	z-crit	LS	Decision
Lecturers	110	3.80	1.17					
				371	0.38	±1.96	0.05	
								Accepted
Students	263	3.86	1.03					

Source: Field Survey, 2024

Table 3 above shows Z-test Analysis on the extent the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities in Rivers State. The result on the table showed that there is no significant difference between the mean opinion scores of lecturers and students on the extent the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities in Rivers State. The result on the table further showed a z-calculated value of 0.38 which was less than the z-critical value of ±1.96 at 0.05 level of significance and with a degree of freedom of 371, since the z-calculated (0.38) was less than the z-tabulated (±1.96), the null hypothesis was accepted which states that there is no significant difference between the mean opinion scores of lecturers and students on the extent the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities in Rivers State.

2. There is no significant difference between the mean opinion scores of lecturers and students on the extent the use of AI enhances the conduct of research towards Educational Goals attainment in Public Universities in Rivers State.

Table 4: Z-test Analysis on the Extent the Use of AI enhances the conduct of research towards Educational Goals attainment in Public Universities in Rivers State.

Respondents	N	$\bar{x}$	Std	DF	z-cal	z-crit	LS	Decision
Lecturers	110	3.38	0.89					
				371	0.74	±1.96	0.05	
Students								Accepted
	263	3.41	0.87					

Source: Field Survey, 2024.

The result on Table 4 above shows Z-test Analysis on the extent the use of AI enhances the conduct of research towards Educational Goals attainment in Public Universities in Rivers State. The result on the table showed that there is no significant difference between the mean opinion scores of lecturers and students on the extent AI-based assessment tools influence Teachers Instructional Delivery in Senior Secondary Schools in Port Harcourt Metropolis, Rivers State. The result on the table further showed a z-calculated value of 0.74 which was less than the z-critical value of ±1.96 at 0.05 level of significance and with a degree of freedom of 371, since the z-calculated (0.74) was less than the z-tabulated (±1.96), the null hypothesis was accepted which states that there is no significant difference between the mean opinion scores of lecturers and students on the extent the use of AI enhances the conduct of research towards Educational Goals attainment in Public Universities in Rivers State.

Discussion of Findings

The findings of the study are discussed as follows:

Table 1 above shows Z-test Analysis on the extent the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities in Rivers State. The result on the table 4 further showed a z-calculated value of 0.38 which was less than the z-critical value of ±1.96 at 0.05 level of significance and with a degree of freedom of 371, since the z-calculated (0.38) was less than the z-tabulated (±1.96), the null hypothesis was accepted which states that there is no significant difference between the mean opinion scores of lecturers and students on the extent the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities in Rivers State. This result was in line with that of Ogunode and Gregory (2023) who studied Artificial Intelligence (AI) in educational management. These results show how important AI is when fully applied in education.

Table 2 in response to research question 2 which states, to what extent does the use of AI enhance the conduct of research towards Educational Goals attainment in Public Universities

in Rivers State. The result on the table further showed a z-calculated value of 0.74 which was less than the z-critical value of ±1.96 at 0.05 level of significance and with a degree of freedom of 371, since the z-calculated (0.74) was less than the z-tabulated (±1.96), the null hypothesis was accepted which states that there is no significant difference between the mean opinion scores of lecturers and students on the extent does the use of AI enhance the conduct of research towards Educational Goals attainment in Public Universities in Rivers State. The findings are in line with Woolf et al., (2021), who states that, AI can provide real-time support to students with disabilities through tools like voice recognition, text-to-speech, and visual recognition systems. Moreover, AI-powered platforms can ensure that learning content is accessible to students from diverse linguistic and cultural backgrounds, promoting a more globalized educational experience.

Conclusion

In view of the results obtained from the study, the researcher concluded that, the use of AI applications influences teaching and research for Educational Goals attainment in Public Universities and the use of AI enhances the conduct of research towards Educational Goals attainment in Public Universities. In conclusion, the integration of Artificial Intelligence (AI) in teaching and research offers tremendous potential for enhancing educational outcomes and achieving academic goals in public universities in Rivers State. The transformative impact of AI in these institutions is evident in various aspects, such as personalized learning, data-driven decision-making, and streamlined administrative processes. AI-powered tools can significantly improve the learning experience for students by offering tailored content, adaptive learning systems, and instant feedback mechanisms, thereby promoting student engagement and academic success.

Recommendation

Based on the findings, it was recommended that:

1. Public universities in Rivers State should prioritize investments in AI infrastructure, including high-performance computing systems, cloud services, and data management platforms. These tools are essential for supporting AI-powered teaching and research tools, enabling effective data analysis, simulations, and personalized learning experiences.

2. To fully harness the potential of AI, university administrators should implement regular training programs for faculty members to enhance their knowledge and skills in using

AI technologies. This will ensure that lecturers are capable of integrating AI-based teaching methodologies and tools into their curricula, as well as conducting AI-driven research.

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Artificial Intelligence Enabled Financial Management Tools for Effective Quality Service Delivery in Rivers State Universities

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Abstract

The study investigated artificial intelligence enabled financial tools would enhance effective quality service delivery in Rivers State universities. Three objective and three hypotheses guided the study. The research design adopted in this study was the descriptive survey design. This study was carried out in Rivers State. The population of this study is 169 administrative principal staffs in Rivers State University and Ignatius Ajuru University of Education. The entire population was taken as census without sampling due to the manageable size of the population. The instrument for data collection in this study was a self-structured questionnaire titled: "Artificial Intelligence Enabled Financial Management Tools for Quality Service Delivery Questionnaire" To ensure the face and content validity of the instrument, the instrument was given to experts, in Educational Management, Rivers State University. The internal consistency of the instrument was established using the Cronbach Alpha method which yielded reliability indexes of 0.72, 0.79, and 0.84 for the various sections of the instrument respectively. The research questions were answered using mean and standard deviation, while the hypotheses were tested using z-test at 0.05 level of significance. The study found that Artificial intelligence enabled financial automation tools, auditing and budgeting would enhance quality service delivery in Rivers State universities. The study recommended among others that Government should implement artificial intelligence enabled auditing tools in universities. This will enhance accurate documentation of financial reports and reduce spending.

Keywords: Artificial Intelligence, Financial Management, Tools, Quality Service, Delivery

Introduction

Recently, quality service delivery has been flagged as the source of actualization of educational objectives in Nigerian tertiary institutions. The extent to which educational service is delivered with quality determine the rate at which universities accomplish educational goals. Quality service delivery refers to a university's capacity to provide services that meet internal quality standards, which are developed based on the management's understanding of the requirements and expectations of students and staff (Basu, 2014). Quality service delivery could also be referred to as the degree to which the university's services satisfy the requirements of its

consumers, including students, staff, and the broader society (Okpa, 2019). The quality-of-service delivery in universities is determined by their capacity to meet the specific or general educational requirements of a nation through student instruction, research endeavours, knowledge dissemination, and other community service initiatives. However, quality service delivery in the university could be jeopardized when finances are poorly managed.

Financial management is an important aspect of the university that requires a substantial attention. Financial management is the corporate function that focuses on maximising profitability, managing expenses, and effectively managing cash and credit. Its purpose is to ensure that the organisation has the necessary resources to achieve its objectives successfully (Howard, 2012). Financial management focuses on effectively obtaining and utilising financial resources, both in the short and long term, to meet the goals of the organization. The impact of financial mismanagement can overwhelm university's achievement of educational objectives, by reducing employees' performance and student' effectual learning. Financial mismanagement occurs mostly when people in charge of finances appears lack transparency and absolute strictness in financial matters. Hence, the need for artificial intelligence in financial management.

Artificial intelligence is an emerging technology that is rapidly looming over all sectors and financial sector is inclusive. In an increasingly digitized world, the use of artificial intelligence (AI) in financial management has created a significant transformational phenomenon (Muhammed, Siska & Haim, 2024). The implementation of artificial intelligence in financial automation, auditing and budgeting has made financial management process to be seamless.

Artificial intelligence (AI) is revolutionizing financial automation by enhancing efficiency, reducing costs, and improving customer experiences across various sectors. Automation refers to the utilisation of technology to carry out operations that would otherwise necessitate human involvement, such as data input, customer support, billing, and inventory control. The integration of AI technologies, such as machine learning and robotic process automation (RPA), is reshaping traditional financial practices and unlocking new opportunities for innovation even in the University community. Adeyeri (2024) stated that myriads of financial institutions have successfully implemented AI in financial automation, resulting to enhanced accuracy and effective customer service. Similarly, fraud detection and error identification become easier by implementation of AI in financial automation (Manoharan et al. 2024). Artificial intelligence is increasingly utilized in financial services for automation, enhancing effectiveness, accuracy,

and cost-efficiency (Rahul & Ritesh 2024). Through the implementation of artificial intelligence in financial automation, university administrators can decrease operational expenses, enhance productivity, and allocate more time towards strategic and innovative endeavours. Accounting processes can be mechanised through the utilisation of software tools such as QuickBooks AI or FreshBooks AI. These systems are capable of managing tasks such as generating invoices, handling billing, submitting taxes, and tracking expenses (Denning, 2019). Universities can utilise technologies such as Buffer or Hootsuite to efficiently plan and publish material on various social media platforms. These tools also enable universities to keep track of and engage with audience feedback and messages.

Another area of financial management that artificial intelligence could be very useful is auditing. Auditing, often known as a financial audit, is a formal inspection and authentication of a company's financial records. The primary objective of auditing is to ensure the accuracy of a company's financial statements and its compliance with regulatory standards. Auditing provides investors, creditors, and other stakeholders with a level of confidence in a company's reliability and integrity. Financial auditing plays a crucial role in ensuring transparency, accountability, and sustainability within organizations. The systematic evaluations of financial statements and practices, which are essential for informed decision-making by stakeholders could effectively performed by artificial intelligence to improve maintenance of ethics in financial auditing (Voinea et al., 2024; Adetoso & Akinserule, 2016). According to Kinamdali et al (2024), the application of artificial intelligence would improve auditing standards and help mitigate financial mismanagement, ensuring that budgets are maintained effectively.

Budgeting is one of the aspects of financial management that often require insightful decision through available data and resources. In Braide's (2012) definition, a budget is described as a comprehensive plan that outlines the specific actions a corporate organisation expects to undertake within a specified future timeframe. The budget suggestions refer to the precise initiatives that the university intends to implement. Many artificial intelligence tools have been developed to help business plan financial budget in a smarter way. Such tools are not limited to generative AI, mosaic Arc AI, we money and many more. The integration of artificial intelligence in financial budgeting not only enhances accuracy but also fosters a proactive approach to fiscal management. By utilizing advanced algorithms, organizations can analyze historical data and predict future trends with remarkable precision, allowing for real-time adjustments that align budgets with shifting market conditions (Pawar, et al., 2023). Moreover, the incorporation of AI-driven tools like ExpenseXpert offers users personalized insights into

their spending habits, enabling them to establish more effective budgetary controls and ultimately promoting better financial discipline (Jain & Kulkarni, 2023).

Although, artificial intelligence utilization is not yet common in developing countries like Nigeria, but it is gradually gaining momentum is certain sectors especially education. It is important that artificial intelligence is implemented in financial management of universities as it would aid administrators with seamless financial management practice with assurance of high ethical standard.

Statement of the problem.

The current economic downturn has caused low funding of tertiary institutions by state governments. Hence, the need for effective management of available financial resources. However, the problem of financial mismanagement is creeping in tertiary institution leading to inadequate funding, low financial allocation, inadequately equipped libraries and laboratories and many more. These have created obstacles against the delivery of quality services in the universities. In order to find a lasting solution to this plight, the researcher investigated artificial intelligence enabled financial management tools for effective quality service delivery in Rivers State universities.

Purpose of the study

The purpose of the study was to determine the extent artificial intelligence enabled financial tools would enhance effective quality service delivery in Rivers State universities.

Specifically, the study sought to;

1. determine the extent artificial intelligence enabled financial automation tools would enhance quality service delivery in Rivers State universities.
2. determine the extent artificial intelligence enabled auditing tools would enhance quality service delivery in Rivers State universities.
3. examine the extent artificial intelligence enabled financial budgeting tools would enhance quality service delivery in Rivers State universities.

Research Question

The following research questions guided the study

1. To what extent would artificial intelligence enabled financial automation tools enhance quality service delivery in Rivers State universities?
2. To what extent would artificial intelligence enabled auditing tools enhance quality service delivery in Rivers State universities?

3. To what extent would artificial intelligence enabled financial budgeting tools enhance quality service delivery in Rivers State universities?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance.

1. There is no significant difference between the mean response of administrators in Rivers State University and Ignatius Ajuru University of Education on the extent to which artificial intelligence enabled financial automation tools would enhance quality service delivery in Rivers State universities.

2. There is no significant difference between the mean response of administrators in Rivers State University and Ignatius Ajuru University of Education administrators on the extent to which artificial intelligence enabled auditing tools would enhance quality service delivery in Rivers State universities.

3. There is no significant difference between the mean response of administrators in Rivers State University and Ignatius Ajuru University of Education administrators on the extent to which artificial intelligence enabled financial budgeting tools would enhance quality service delivery in Rivers State universities.

Methodology

The research design adopted in this study was the descriptive survey design. This study was carried out in Rivers State. The population of this study is 169 administrative staff consisting of 6 principal officers (Vice Chancellor, Deputy Vice Chancellor administration and Deputy Vice Chancellor academics, Registrar, University Librarian and Bursar), 14 Deans of Faculties, 79 Heads of Departments and 8 Directors of Centres from Rivers State University and 4 principal officers (Vice Chancellor, Registrar, University Librarian and Bursar), 6 Deans of Faculties, 37 Heads of Departments and 15 Directors of Centres from Ignatius Ajuru University of Education. The entire population was taken as census without sampling due to the manageable size of the population. The instrument for data collection in this study was a self-structured questionnaire titled: "Artificial Intelligence Enabled Financial Management Tools for Quality Service Delivery Questionnaire (AIEFMQSDQ)". The questionnaire was structured on a four-point rating scale of Very High Extent (VHE) = 4, High Extent (HE) = 3, Low Extent (LE) = 2, Very Low Extent (VLE) = 1. To ensure the face and content validity of the instrument, the instrument was given to experts, in Educational Management, Rivers State University. The internal consistency of the instrument was established using the Cronbach Alpha method which

gave were collated and analyzed which yielded reliability indexes of 0.72, 0.79, and 0.84 for the various sections of the instrument respectively. Out of 169 copies of the instrument administered, 160 copies were retrieved and used for analysis. This represents 96% retrieval rate and considered encouraging. The research questions were answered using mean and standard deviation, while the hypotheses were tested using z-test at 0.05 level of significance. Decision rule for the research questions were based on the classification of level of extent as shown below:

Classification	Value Range
High Extent (HE)	2.50 – 4.00
Low Extent	1.00 – 2.49

Similarly, decision for the hypotheses was to accept the null hypotheses where the calculated z-value is less than critical z-critical value of ±1.96, but reject the null hypotheses where the calculated z-value is greater than critical z-critical value of ±1.96.

Result

Research Question 1: To what extent would artificial intelligence enabled financial automation tools would enhance quality service delivery in Rivers State universities.

Table 1: Mean Analyses on the Extent to which Artificial Intelligence Enabled Financial Automation Tools Would Enhance Quality Service Delivery in Rivers State universities.

S/N	ITEMS	RSU N = 92			IAUOE = 68		
		Mean	S.D.	Remark	Mean	S.D.	Remark
1	AI enabled financial tools can help to automate insights using available financial	3.04	0.83	High extent	2.91	0.79	High extent
2	AI could enable university administrators take financial decisions in accordance to certain financial trends	3.05	0.83	High extent	3.10	0.85	High extent
3	Artificial intelligence financial automation could help in reducing errors in financial transaction.	3.17	0.87	High extent	3.07	0.83	High extent
4	AI financial tools could help automate financial predictions and forecasting of trends in university revenue and expenditure.	3.13	0.86	High extent	2.92	0.80	High extent
5	AI financial tools could be helpful in reducing theft of university funds when expenditures are automated.	3.24	0.89	High extent	2.96	0.81	High extent
6	AI financial automation tool such as Domo would help in the preparation of financial reporting thereby reducing cost	3.12	0.85	High extent	3.08	0.84	High extent

7	Utilisation of Artificial intelligence tools would encourage continuous improvement by automatically identifying the activities that drain University's finances.	3.27	0.90	High extent	3.20	0.88	High extent
8	AI automation tool like Caribou could help in automatically generating documents and facilitates intercompany activities	3.11	0.72	High extent	3.01	0.91	High extent
	Grand Mean and S.D	**3.14**	**0.84**		**3.03**	**0.84**	

Source: Research Data, 2024

Table 1 shows the responses of the extent to which artificial intelligence enabled financial automation tools would enhance quality service delivery in Rivers State universities.   From RSU, Items 1 to 8 with mean responses of 3.04, 3.05, 3.17, 3.13, 3.24, 3.12, 3.27, and 3.11 were rated high extent. Similarly, from IAUE, items 1 to 8 with mean responses of 2.91, 3.10, 3.07, 2.92, 2.96, 3.08, 3.20 and 3.01 were rated high extent. The grand mean of the two groups of respondents 3.14 and 3.03 indicated a high extent as it is beyond the benchmark of 2.50 which is the criterion mean. The standard deviation values of 0.84 and 0.84 for RSU and IUAE respectively indicate that responses on the extent to which artificial intelligence enabled financial automation tools enhance quality service delivery in Rivers State universities. do not vary much.

Research Question 2: To what extent would artificial intelligence enabled auditing tools enhance quality service delivery in Rivers State universities?

Table 2: Mean Analyses on the Extent would Artificial Intelligence Enabled Auditing Tools Enhance Quality Service Delivery

S/N	Items	RSU Staff=92			IAUE Staff = 68		
		Mean	S.D.	Remark	Mean	S.D	Remark
9	AI auditing tools will encourage university administrators to adhere strictly to financial rules and regulations	3.00	0.81	High extent	3.13	0.83	High extent
10	AI auditing tool could help university administrators in easy financial verifications.	2.92	0.70	High extent	3.04	0.74	High extent
11	Being built with financial auditing standard, AI tools could enhance compliance with relevant statutory provisions and accounting standards.	3.05	0.82	High extent	3.13	0.71	High extent
12	AI auditing tools could aid compulsory compliance with university's financial policies.	2.99	1.03	High extent	2.94	0.70	High extent
13	AI enabled auditing would largely reduce financial errors and anomaly detection with minimal human intervention	3.10	0.91	High extent	3.28	0.82	High extent
14	Financial mismanagement could be easily traced with Artificial Intelligence tools for	3.08	0.83	High extent	2.74	1.02	High extent

auditing, thereby aiding quality service delivery.			
Grand Mean	**3.02** **0.85**	**3.04** **0.80**	

Source: Research Data, 2024

Table 2 revealed the responses on the extent to which artificial intelligence enabled financial auditing tools would enhance quality service delivery in Rivers State universities. From RSU, Items 9 to 14 were rated high extent with mean responses of 3.00, 2.92, 3.05, 2.99, 3.10, and 3.08. Responses from IAUE showed that items 9 to 14 with mean responses 3,13, 3.04, 3.13, 2.94, 3.28, 2.74 were rated high extent. Further confirming the rating, the grand mean of the responses was 3.02 and 3.04 which indicates a high extent as it is beyond the benchmark of 2.50 which is the criterion mean. The standard deviation values of 0.85 and 0.80 for RSU and IUAE respectively showed that there is minimal dispersion in the responses of university administrators on the extent to which artificial intelligence enabled financial auditing tools enhance quality service delivery in Rivers State universities. do not vary much.

Research Question 3: To what extent would artificial intelligence enabled financial budgeting tools enhance quality service delivery in Rivers State universities?

Table 3: Mean Analyses on the Extent would Artificial Intelligence Enabled Financial Budgeting Tools Enhance Quality Service Delivery

S/N	Items	RSU Staff=92			IAUE Staff = 68		
		Mean	S.D.		Mean	S.D.	
15	Utilization of artificial intelligence for budgeting will help university administrators better manage their financial resources towards delivering quality service to the public.	3.09	0.91	High extent	3.31	0.83	High extent
16	AI enabled budgeting tools can enable university administrators plan finances in accordance to priority for quality educational delivery	3.13	0.69	High extent	2.91	0.79	High extent
17	Through AI enabled budgeting tools informed financial decisions could be made for effective service delivery	2.80	0.80	High extent	2.89	0.89	High extent
18	AI could assist university administrators with development of data driven budgets proportional to institutional goals/outcomes.	3.17	0.83	High extent	2.81	0.78	High extent
19	Book AI would facilitate administrators' decision in budgeting by identifying areas to channel limited resources.	2.84	0.82	High extent	3.00	0.82	High extent
20	AI budgeting tool helps in identifying inconsistency and errors pertaining to budgeting with available resource	3.30	0.82	High extent	2.98	0.83	High extent
21	AI budgeting tool could facilitate administrators' budgeting process within financial resources available for the school	2.83	1.07	High extent	2.78	0.72	High extent
	Grand mean	**3.02**	**0.85**	**High Extent**	**2.95**	**0.81**	**High Extent**

Source: Research Data, 2024

Table 2 revealed the responses on the extent to which artificial intelligence enabled financial budgeting tools would enhance quality service delivery in Rivers State universities. From RSU, Items 15 to 21 were rated high extent with mean responses of 3.09, 3.13, 2.80, 3.17, 2.84, 3.30 and 2.83. Responses from IAUE showed that items 15 to 21 with mean responses 3,31, 2.91, 2.89, 2.81, 3.00, 2.98 and 2.78 were rated high extent. To further confirming the rating, the grand mean of the responses was 3.02 and 2.95 which indicates a high extent as it is beyond the benchmark of 2.50 which is the criterion mean. The standard deviation values of 0.85 and 0.81 for RSU and IUAE respectively showed that there is minimal dispersion in the responses of university administrators on the extent to which artificial intelligence enabled budgeting tools enhance quality service delivery in Rivers State universities. do not vary much.

Hypothesis testing

There is no significant difference between the mean response of administrators in Rivers State University and Ignatius Ajuru University of Education on the extent to which artificial intelligence enabled financial automation tools would enhance quality service delivery in Rivers State universities.

Table 4: z-test on the Extent to which Artificial Intelligence Enabled Financial Automation Tools Would Enhance Quality Service Delivery in Rivers State universities.

Respondents	N	Mean	S.D	α	Df	z-cal	z-tab.	Decision
RSU	92	3.15	0.85					Accepted.
				0.05	158	0.57	± 1.96	
IAUE	68	3.05	0.83					

Table 4 above shows that the z-calculated value of 0.57 is less than the z-table value of $\pm$ 1.96 obtained for degree of freedom (158) at 0.05 significance. Hence the null hypothesis was accepted. That is, there is no significant difference in the mean responses of RSU administrators and IAUE administrators on the extent to which artificial intelligence enabled financial automation tools would enhance quality service delivery in Rivers State universities.

There is no significance difference in the mean responses of RSU administrators and IAUE administrators on the extent to which artificial intelligence enabled financial auditing tools would enhance quality service delivery in Rivers State universities.

Table 5: z-test on the Extent to which Artificial Intelligence Enabled Financial Auditing Tools would Enhance Quality Service Delivery in Rivers State universities.

Respondents	N	Mean	S.D.	α	df	z-cal	z-tab.	Decision
RSU	92	3.02	0.85					
				0.05	158	0.13	$\pm$1.96	Accepted.
IAUE	68	3.04	0.80					

Table 5 presented the z-calculated value of 0.13 which is less than the z-table value of $\pm$ 1.96 obtained from 158 degrees of freedom and 0.05 significant level. Therefore, the null hypothesis was not rejected. This implies that there is no significance difference in the mean responses of RSU administrators and IAUE administrators on the extent to which artificial intelligence enabled financial auditing tools would enhance quality service delivery in Rivers State universities.

There is no significant difference between the mean response of administrators in Rivers State University and Ignatius Ajuru University of Education administrators on the extent to which artificial intelligence enabled financial budgeting tools would enhance quality service delivery in Rivers State universities.

Table 6: z-test on the Extent to which Artificial Intelligence Enabled Financial Budgeting Tools would Enhance Quality Service Delivery in Rivers State universities.

Respondents	N	Mean	S. D	α	df	z-cal	z-tab.	Decision
RSU	92	3.02	0.85					
				0.05	158	0.46	$\pm$1.96	Accepted
IAUE	68	2.95	0.81					

Table 6 presented the z-calculated value of 0.46 which is less than the z-table value of $\pm$ 1.96 obtained from 158 degrees of freedom and 0.05 significant level. Therefore, the null hypothesis was not significant. This implies that there is no significance difference in the mean responses of RSU administrators and IAUE administrators on the extent to which artificial intelligence enabled financial budgeting tools would enhance quality service delivery in Rivers State universities.

Discussion of Findings

Findings from research question one as presented in table 1 showed that to a high extent artificial intelligence enabled financial automation tools would enhance quality service delivery in Rivers State universities. The null hypothesis showed that there is no significant difference

in the mean responses of RSU administrators and IAUE administrators on the extent artificial intelligence enabled financial automation tools would enhance quality service delivery in Rivers State universities. University administrators welcomed the implementation of artificial intelligence tools in financial automation because it seems to pose a high level of accuracy and prediction.

Findings from research question one as presented in table two showed that to a high extent artificial intelligence enabled financial auditing tools would enhance quality service delivery in Rivers State universities. The null hypothesis showed that there is no significant difference in the mean responses of RSU administrators and IAUE administrators on the extent artificial intelligence enabled financial auditing tools would enhance quality service delivery in Rivers State universities. This finding is consistent with Muhammed, Siska and Haim (2024) The application of AI is not most effectively restricted to using algorithms and predictive models; on the contrary, this generation is developing a major transformation within the financial decision-making process. The findings is in line with Kinamdali et al (2024) who observed that the application of artificial intelligence would improve auditing standards and help mitigate financial mismanagement, ensuring that budgets are maintained effectively. Also, in tandem with Voinea et al., (2024), the systematic evaluations of financial statements and practices, which are essential for informed decision-making by stakeholders could effectively performed by artificial intelligence to improve maintenance of ethics in financial auditing.

Findings from research question three as presented in table three showed that to a high extent artificial intelligence enabled financial budgeting tools would enhance quality service delivery in Rivers State universities. The null hypothesis showed that there is no significant difference in the mean responses of RSU administrators and IAUE administrators on the extent artificial intelligence enabled financial budgeting tools would enhance quality service delivery in Rivers State universities. This finding relates with David (2020) who observed that artificial intelligence would be very helpful in assisting organization administrators perform budgeting and allocation of resources in a more efficient and effective endeavours. Still supporting the findings, Pawar et al., (2023), maintained that by utilizing advanced algorithms, organizations can analyze historical data and predict future trends with remarkable precision, allowing for real-time adjustments that align budgets with shifting market conditions.

Conclusion

Based on the findings of the study, it was concluded that:

Artificial intelligence enabled financial tools would enhance quality service delivery in Rivers State universities. When artificial intelligence is implemented in financial automation, auditing and financial budgeting, there is tendency for accurate financial documentation and efficient allocation of resources that would aid quality educational service delivery.

Recommendations

Based on the findings of the study, it was recommended that;

1. University administrators should adopt artificial intelligence to automate majority of expenditure and revenues of the university. This will aid accuracy and transparency in financial transaction in the university

2. Government should implement artificial intelligence enabled auditing tools in universities. This will enhance accurate documentation of financial reports and reduce spending.

3. University administrators should also equip her employees on the use of artificial intelligence tools for viable budgeting.

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Influences of Artificial Intelligence Among School Managers of Secondary Schools in Port Harcourt of Rivers State

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Abstract

The study examined the influences of Artificial Intelligence (AI) among school managers in secondary schools in Port Harcourt Rivers State. The study adopts a descriptive survey design. The population of study comprised population of 125 of school managers. A sample of 115 respondents using stratified random technique. The instrument used for data collection was a questionnaire tilted (QIAIASMSSPH) structured on a four-point rating scale. The instrument was validated by three experts and it had a reliability cumulative coefficient of 0.75 obtained using the Cronbach Alpha method. Data collected were analysed using Means and standard deviations and z-tests, was used to test the hypotheses at 0.05 level of significance. The validity and reliability cumulative coefficient of 0.75. A criterion means of 2.50 was set, which means any item that is below the criterion mean is seen as Disagree while the items above the criterion means are seen as Agree. The result showed the different perception held by school managers about the influence of AI in secondary schools in Port-Harcourt Rivers State. The study concludes with recommendations for capacity building and policy formulation to support the effective adoption of AI in secondary education.

Keywords: Artificial Intelligence, School Managers, Influence of Artificial Intelligence

Introduction

The integration of Artificial Intelligence (AI) in education has emerged as a significant development in recent years, offering innovative solutions to traditional challenges in educational management. AI technologies have the potential to transform various aspects of education, from personalized learning experiences to efficient administrative processes. In the context of secondary schools, school managers are increasingly recognizing the potential of AI to assists in (Igbokwe, 2023), developing and updating curricula by analysing educational trends, student performance data, and learning gaps. It provides real-time insights and recommendations for curriculum updates and adjustments, keeping educational content aligned with current standards. Thereby enhance decision-making, optimize resource allocation, and improve overall school management (UNESCO, 2021).

Despite the growing interest in AI, the perceptions of its influence among school managers remain varied factors such as technological readiness, access to resources, and the specific needs of educational institutions influence how these technologies are adopted and utilized (UNESCO, 2021). Understanding these perceptions is critical, as school managers play a pivotal role in implementing and sustaining AI initiatives within their institutions. The study aims to explore the influences of AI among school managers of secondary schools in Port Harcourt Rivers State as they play a key role in ensuring a conducive environment to enhance learning and resources management amongst others which tends to providing insights into their attitudes, concerns, and expectations regarding AI's role in education.

Despite the promise of AI, its adoption and influences among school managers remain underexplored. Understanding the perceptions of those who lead and manage schools is crucial, as their attitudes and acceptance of AI will significantly influence its successful implementation. The study aims to investigate the influences of AI among school managers of secondary schools in the Port Harcourt Rivers State by exploring how these influences will shapen the integration of AI into educational management by identifying the factors that facilitate or hinder its adoption. Through this exploration, the research seeks to provide insights that can guide policy makers, educators, and technologists in optimizing AI role in education.

AI's application in education spans across various functions, including data management, predictive analytics for student performance, personalized learning, and administrative decision-making (Popenici & Kerr, 2017). These technologies have the potential to streamline operations, improve decision-making efficiency, and enhance student outcomes by providing school managers with actionable insights (Popenici & Kerr, 2017).

Conceptual Review

The integration of Artificial Intelligence (AI) in educational management has garnered significant attention in recent years. AI's capabilities in enhancing administrative efficiency, personalizing learning experiences, and improving decision-making processes have been extensively explored in educational settings. Research highlights the growing adoption of AI tools by educational institutions globally, including secondary schools, where the technology is influences as instrumental in transforming traditional administrative practices (Wardat, *et-al* (2024). Several studies have explored the influences of AI among school managers. According to a review by Djokic, *et-al* (2023). AI applications in education have been found to offer various advantages, including improved resource allocation, enhanced data management, and

better student performance tracking. These benefits have led to a positive perception of AI's role in educational management.

Further research has shown that school managers' attitudes towards AI are influenced by their understanding of the technology and its potential benefits. A study conducted by Liberty University (2021) suggested that school managers who are well-informed about AI are more likely to perceive it as a valuable tool for improving educational outcomes. The study also notes that challenges such as lack of training and technological infrastructure can hinder the effective adoption of AI in schools. The role of AI in supporting educational decision-making is a critical area of interest. The literature indicates that AI can aid school managers in making data-driven decisions, thereby enhancing the overall quality of education. However, the extent to which AI is influences as useful varies depending on factors such as the level of technological advancement in schools and the availability of resources Seo, *et-al* (2021).

AI's application in education spans across various functions, including data management, predictive analytics for student performance, personalized learning, and administrative decision-making (Popenici & Kerr, 2017). These technologies have the potential to streamline operations, improve decision-making efficiency, and enhance student outcomes by providing school managers with actionable insights (Popenici & Kerr, 2017). Research by Popenici and Kerr (2017) highlights the transformative potential of AI in educational settings, emphasizing its capacity to enhance both administrative and instructional efficiency. School managers who perceive AI as useful are more likely to adopt and integrate these technologies into their schools' daily operations, thus driving innovation in educational management (Popenici & Kerr, 2017).

Furthermore, while AI holds significant potential for educational management, its influences among school managers is contingent on several factors, including knowledge, infrastructure, and training. Continued research is necessary to explore these dynamics further and to develop strategies that can facilitate the effective integration of AI in educational settings. However, the influences of AI among school managers in secondary schools across Nigeria remains an area requiring further exploration. Understanding their perceptions is essential for successful AI integration, as their attitudes towards these technologies can influence the extent to which AI is adopted and utilized.

School managers often view AI as a tool that can enhance operational efficiency, improve decision-making, and support personalized learning environments.

1. Administrative Efficiency: AI is influences to streamline various administrative tasks such as scheduling, record-keeping, and data analysis, which can lead to significant time savings and operational efficiency

2. Decision-Making Support: AI systems can provide data-driven insights that aid in more informed decision-making. This includes analysing student performance, predicting academic outcomes, and optimizing resource allocation

3. Personalized Learning: AI technologies enable personalized learning experiences by adapting educational content to individual student needs, which can enhance student

4. Challenges and Barriers: Despite the influence's benefits, there are challenges such as the need for adequate training, resistance to change, and concerns about data privacy and ethical implications

Statement of the Problem

Educational institutions face unique challenges such as limited resources and varying levels of technological infrastructure, the adoption of AI has the potential to significantly transform the management of secondary schools (Abdullahi, 2023). School managers, as key decision-makers, play a crucial role in determining how these technologies are implemented and leveraged to improve educational outcomes. Its adoption and influences among school managers remain underexplored. Understanding the perceptions of those who lead and manage schools is crucial, as their attitudes and acceptance of AI will significantly influence its successful implementation. The study aims to investigate the influences of AI among school managers of secondary schools in Port Harcourt Rivers State, exploring how these perceptions shape the integration of AI in educational management and identifying the factors that facilitate or hinder its adoption. Through this exploration, the research seeks to provide insights that can guide policymakers, educators, and technologists in optimizing AI's role in education.

Purpose of the Study

The purpose of the study was to examine the influence of AI among managers of secondary schools in Port Harcourt of Rivers State. Specifically, the study sought to achieve the following:

1. Find out the influences of artificial intelligence (AI) in teaching and learning among school managers of secondary school in Port Harcourt, Rivers State.

2. Ascertain the usefulness of artificial intelligence (AI) in school planning among school managers of secondary school in Port Harcourt, Rivers State.

3. Determine the influences of artificial intelligence (AI) on student assessment among school managers of secondary school in Port Harcourt metropolis, Rivers State.

Research Questions

The following research questions guided the study:

1. What are the influences of artificial intelligence (AI) in teaching and learning among school managers of secondary school in Port Harcourt metropolis, Rivers State?

2. What are the influences of artificial intelligence (AI) in school planning among school managers of secondary school in Port Harcourt metropolis, Rivers State?

3. What are the influences of artificial intelligence (AI) in student assessment among school managers of secondary school in Port Harcourt metropolis, Rivers State?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

H01: There is no significant difference between the mean scores of male and female principals on the influence artificial intelligence (AI) in teaching and learning among school managers of secondary school in Port Harcourt Rivers State.

H02: There is no significant difference between the mean scores of male and female principals on the influence artificial intelligence (AI) in school planning among school managers of secondary school in Port Harcourt, Rivers State.

H03: There is no significant difference between the mean scores of male and female principals on the influence artificial intelligence (AI) in student assessment among school managers of secondary school in Port Harcourt, Rivers State.

Methodology

The study used a descriptive survey, the method to comprehensively assess the influences of AI among secondary school managers in Port Harcourt. The design allows for the collection of both numerical data and detailed insights into managers' experiences and perceptions. The study was carried out in Obio-Akpor and Port Harcourt City Local Government Areas of Rivers State. The population of the study comprises 125 school managers from secondary schools in Port Harcourt. A stratified random sampling technique was employed to select school managers from different types of secondary schools (public and private) to ensure diversity. The sample size of the study was 115 respondents which consisted of 60 female and 50 male of school

managers of senior secondary schools in Port Harcourt of Rivers State statistical achieved from surveyed using Cronbach's formula. The instrument for data collection was structured a questionnaire titled "Questionnaires Influences of Artificial Intelligence among School Managers of Secondary Schools in Port Harcourt (QIAIASMSSPH)". The questionnaire included Likert-scale items made of 5 clusters A, B, C, D and E each cluster of the instrument structured on a 4-point modified type rating scale optioned: Strongly Agree, (SA= 4 Points), Agree (A= 3 Points), Disagree (D= 2 Points), Strongly Disagree (SD -1 point) to measure influences , challenges, and benefits of AI tools, Means and standard deviations were used to analyse the data and z-tests, was used to test the hypotheses at 0.05 level of significance. The validity and reliability cumulative coefficient of 0.75. A criterion means of 2.50 was set, which means any item that is below the criterion mean are seen as Disagree while the items above the criterion means are seen as Agree.

Results

Research Question 1: What are the influences of artificial intelligence (AI) in teaching and learning among school managers of secondary school in Port Harcourt metropolis, Rivers State?

Table 1: **Influences of artificial intelligence (AI) in teaching and learning among school managers of secondary school in Port Harcourt metropolis, Rivers State**

S/N	School Managers adopts AI in teaching and learning to:	Female (n = 60)			Male (n =45)			$\frac{(x_1 + x_2)}{2}$
		x_1	S.D	RMK	x_2	S.D	RMK	
1	Improve on efficient data management.	3.35	0.92	Agree	3.09	0.79	Agree	3.13
2	Improve accessibility to school documents.	3.25	0.88	Agree	3.42	0.58	Agree	3.34
3	Assess teacher performance, identifying areas for professional development.	3.33	0.60	Agree	3.29	0.79	Agree	3.31
4	Disabilities student accessibility to education, by offering adaptive learning technologies and support systems.	3.32	0.81	Agree	3.29	0.76	Agree	3.31
5	Enhance better communication with students and management team	3.37	0.66	Agree	3.27	0.75	Agree	3.32
6	Provide data analysis to school management team for decision making	2.87	1.08	Disagree	3.29	0.79	Agree	3.08
	Average	3.24	0.82		3.27	0.74		

Analysis:
Refer to the table 1 above, shown the mean scores of female and male principals 3.24 and 3.27 receptivity which are above average minimum mean criterion 2.50 i.e. It was agreed that artificial intelligence (AI) has influence in teaching and learning among school managers of secondary school in Port Harcourt Rivers State.

Research Question 2: What are the influences of artificial intelligence (AI) in school planning among school managers of secondary school in Port Harcourt, Rivers State?

Table 2: **Influences of artificial intelligence (AI) in school planning among school managers of secondary school in Port Harcourt Rivers State?**

S/N	School Managers adopts AI in School planning to:	Female (n = 60)			Male (n =45)			Mean Set $\frac{(x_1 + x_2)}{2}$
		x_1	S.D	RMK	x_2	S.D	RMK	
7	Classification of academic curriculum.	2.98	1.10	Disagree	3.33	0.90	Agree	3.16
8	helps streamline administrative tasks, such as resource allocation and scheduling,	3.18	0.95	Agree	3.29	0.94	Agree	3.24
9	Reduces the chances of misplacement of records	3.30	0.81	Agree	3.20	0.81	Agree	3.25
10	Ensure that accurate information is readily available.	3.35	0.94	Agree	3.22	0.79	Agree	3.29
11	Allows administrators to assign roles with specific permission bases on job responsibilities	3.22	0.85	Agree	3.42	0.69	Agree	3.32
12	AI enables school managers to make data-driven decisions, improving the accuracy and effectiveness of educational strategies	3.05	0.95	Agree	3.31	0.79	Agree	3.08
	Average	**3.18**	**0.93**		**3.30**	**0.82**		

Analysis:

Refer to the table 2 above, shown the mean scores of female and male principals 3.18 and 3.30 receptivity which are above average minimum mean criterion 2.50 i.e. It was agreed that artificial intelligence (AI) has influence in school planning among school managers of secondary school in Port Harcourt Rivers State.

Research Question 3: What are the influences of artificial intelligence (AI) in student assessment among school managers of secondary school in Port Harcourt, Rivers State?

Table 3: **Influences of artificial intelligence (AI) in student assessment among school managers of secondary school in Port Harcourt metropolis, Rivers State?**

S/N	School Managers adopts AI in student assessment to:	Female (n = 60)			Male (n =45)			Mean Set $\frac{(x_1 + x_2)}{2}$
		x_1	S.D	RMK	x_2	S.D	RMK	
13	Make available sensitive records of student to authorized personnel	3.13	0.89	Agree	3.49	0.69	Agree	3.31
14	identify students' strengths and weaknesses, allowing school managers to implement personalized learning strategies that improve overall educational outcomes	3.17	0.74	Agree	3.40	0.81	Agree	3.29
15	Reduce risk of student data manipulation	3.06	0.96	Agree	3.24	0.77	Agree	3.15
16	Improve accountability of academic record data/information been archived	3.17	0.91	Agree	3.24	0.77	Agree	3.21
17	Track students' progress, over time.	3.27	0.82	Agree	3.31	0.82	Agree	3.29

18	helps to reduce biases in grading by providing consistent evaluations based on predefined criteria, which enhances fairness	3.32	0.75	Agree	3.16	0.77	Agree	3.24
19	Assessment tools can automate the grading process, reducing the time required for marking and providing immediate feedback to students.	3.22	0.80	Agree	3.42	0.72	Agree	3.32
20	tailor assessments to individual students' learning needs, providing more accurate evaluations of their abilities and progress	3.28	0.76	Agree	3.36	0.71	Agree	3.32
	Average	**3.20**	**0.82**		**3.32**	**0.75**		

Analysis:
Refer to the table 3 above, shown the mean scores of female and male principals 3.20 and 3.32 receptivity which are above average minimum mean criterion 2.50 i.e. It was agreed that artificial intelligence (AI) has influence in student assessment among school managers of secondary school in Port Harcourt Rivers State

Test of Hypothesis

H01: There is no significant difference between the mean scores of the male and female principals on the influences of artificial intelligence (AI) in teaching and learning among school managers of secondary school in Port Harcourt, Rivers State.

Table 4: Z-Test Analysis on significant in the mean response manager influences of artificial intelligence (AI) in teaching and learning in secondary school in Port Harcourt, Rivers State.

Groups	N	x	S.D.	Z-cal	Z-crit	Decision
Female	60	3.24	0.82	-0.17	1.96	Accepted
Male	45	3.27	0.74			

The result in Table 4 shows the test of hypotheses one. As shown, calculated value of z (z-cal) = 0.17 while the critical value of z (z-crit) = 1.96. Since z-cal is less than z-crit, the hypothesis was accepted at 0.05.

H02: There is no significant difference between the mean scores of the male and female principals on the influences of artificial intelligence (AI) in school planning among school managers of secondary school in Port Harcourt, Rivers State

Table 5: Z-Test Analysis on significant difference influences of artificial intelligence (AI) in school planning among school managers of secondary school in Port Harcourt metropolis, Rivers State.

Groups	N	x	S.D.	Z-cal	Z-crit	Decision
Female	60	3.18	0.93	-0.67	1.96	Accepted
Male	45	3.30	0.82			

The result in Table 5 shows the test of hypotheses. As shown, calculated value of z (z-cal) = 0.67 while the critical value of z (z-crit) = 1.96. Since z-cal is less than z-crit, the hypothesis was accepted at 0.05.

H03: There is no significant difference between the mean scores of the male and female principals on the influences of artificial intelligence (AI) in student assessment among school managers of secondary school in Port Harcourt, Rivers State

Table 6: Z-Test Analysis on significant influences of artificial intelligence (AI) in student assessment among school managers of secondary school in Port Harcourt metropolis, Rivers State.

Groups	N	x	S.D.	Z-cal	Z-crit	Decision
Female	60	3.20	0.82	-0.45	1.96	Accepted
Male	45	3.32	0.75			

The result in Table 6 shows the test of hypotheses. As shown, calculated value of z (z-cal) = 0.45 while the critical value of z (z-crit) = 1.96. Since z-cal is less than z-crit, the hypothesis was accepted at 0.05.

Discussion

The major finding in the study was Firstly, the influences of artificial intelligence (AI) in teaching and learning among school managers of secondary school in Port Harcourt, Rivers State, it was positive agree that the significant difference between the mean scores of male and female principals on the influence artificial intelligence (AI) in teaching and learning among school managers of secondary school in Port Harcourt Rivers State. The tested hypothesis is accepted at 0.05, show a significant difference of z-cal (-0.17 less than z-crit (1.96). This result is in agreement with the findings of Igbokwe, (2023), that AI technologies have the potential to transform various aspects of education, from personalized learning experiences to efficient administrative processes. In the context of secondary schools, school managers are increasingly recognizing the potential of AI to assists in developing and updating curricula by analysing educational trends, student performance data, and learning gaps.

Another major finding is the usefulness of artificial intelligence (AI) in school planning among school managers of secondary school in Port Harcourt. The study found a significant positive acceptance of artificial intelligence (AI) in school planning among school managers of secondary school in Port Harcourt, Rivers State. The tested hypothesis is accepted at 0.05, show

a significant difference of z-cal (-0.67) than z-crit (1.96). This confirmed UNESCO (2021) that AL provides real-time insights and recommendations for curriculum updates and adjustments, keeping educational content aligned with current standards. Thereby enhance decision-making, optimize resource allocation, and improve overall school management.

The third finding showed artificial intelligence (AI) on student assessment among school managers of secondary school in Port Harcourt metropolis, Rivers State. , it was positive agree that the significant difference between the mean scores of male and female principals on student assessment and also The tested the hypothesis show an accepted result among school managers of secondary school in Port Harcourt Rivers State. This result is in agreement with the findings of (Popenici & Kerr, 2017) that AL have the potential to streamline operations, improve decision-making efficiency, and enhance student outcomes by providing school managers with actionable insights

Conclusion

The study concludes that Artificial Intelligence (AI) is seen as highly beneficial to school managers of secondary schools in Port Harcourt. AI tools are valued for their potential to enhance administrative efficiency, streamline decision-making, and support personalized student management. However, challenges such as high implementation costs, technical limitations, and resistance to change are significant barriers to widespread adoption. These findings underscore the importance of addressing these obstacles to fully leverage AI's benefits in educational management.

Recommendations

Based on the finding of the study the following recommendations were made that Ministry of education should encourage professional development by to build technical skills among school managers and staff, ensuring they are well-equipped to utilize AI tools effectively.

The study recommends that school managers should be encouraged to explore and integrate AI technology in school's management to enable them to discover new ideas and perspectives with effective teaching and brainstorming

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Artificial Intelligence and Quality Service Delivery in Rivers State Owned Universities for Sustainable National Development

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Abstract

The study investigated artificial intelligence and quality service delivery in Rivers State owned universities for sustainable national development. Three purposes of the study were formulated, three research questions and three hypotheses guided the study. The correlational survey design was adopted. The population of the study was 82 teaching staff of the two Rivers State owned universities who also served as the respondents. Census sampling was used. The Artificial Intelligence and Quality Service Delivery Questionnaire (AIQSDQ) was used as the instrument for data collection. The reliability coefficient of the instrument was 0.78, 0.81 and 0.79 respectively. Data obtained were analyzed using mean and standard deviation to answer research questions whiles the Z – ration was used to test hypotheses at 0.05 level of significance. All the items on the instrument were accepted, meaning there is a significant relationship between artificial intelligence and service delivery. Thus, the recommendation of inculcating artificial intelligence in service delivery related activities was solicited.

Keywords: Artificial intelligence, Service delivery, Rivers State Universities, Sustainable development, Educational management.

Introduction

Given the issues surrounding quality service delivery in Educational Management which is mixed with a feeling of perfections and imperfections on the side of educational managers, there is need to apply the services of Artificial Intelligence as a trending paradigm globally.

The phrase "Artificial Intelligence" is a combination of two words namely: "Artificial and Intelligence ". Artificial intelligence also known as (AI) in education refers to the integration and application of Artificial Intelligence technologies to enhance teaching and learning processes. This includes a wide range of technologies and approaches that use machine learning, natural language processing, data analysis, and other Artificial Intelligence techniques to create more personalized, efficient, and effective educational experiences (Nwankwo, 2007).

Artificial intelligence (AI) has increasingly become a transformative force across various sectors, including education. The integration of Artificial Intelligence in educational management holds the promise of significantly enhancing the quality of service delivery, which

is crucial for sustainable national development. Artificial Intelligence technologies can streamline administrative processes, personalize learning experiences, and provide data-driven insights for decision-making, thereby improving efficiency and outcomes in educational institutions. In other words, the term Artificial Intelligence is commonly used to describe a range of different technologies in use today which involves the theory and development of computer systems capable of performing tasks that historically required human intelligence, such as recognizing speech, making decisions, and identifying patterns (Nwankwo, 2007).

The above position of Nwankwo seems to have a corresponding view with that of Unachukwu and Ebenebe, (2001) see quality service delivery in educational management as the effective and efficient provision of educational services that meet or exceed the expectations of stakeholders, including students, parents and teachers. This ensures that, the delivery of services enhances the learning experience and outcomes for all students. This in the well-informed opinion of the authors could not have been easily achieved without the effective use and application of artificial intelligence.

Consequently, Sly and Wawiyil (2019) identified sustainable national development in education as the process of enhancing the educational system of a country in a way that meets current educational needs without compromising the ability of future generations to meet their own needs. This concept is grounded in the broader framework of sustainable development, which balances economic growth, social inclusion and environmental protection. This is to create an educational system that not only supports individual growth and societal progress but also contributes to the long-term sustainability of the nation as a whole. Impliedly, educational management as a field that is concerned with the operation of educational organizations in the state is mainly associated with the process of planning, organizing and directing activities in a school, effectively utilizing human and material resources in order to accomplish the school's objectives.

Artificial Intelligence is a trending phenomenon globally, as a result, most countries are keying into this global phenomenon because of the perception that, its application into any sector of development enhances the achievement of desired goals. The promptness of this study was necessitated by the perception of countries that are keying into the exploits of artificial intelligence in the sense that, if artificial intelligence is introduced into the educational sector, it will help enhance quality service delivery in the sector.

Conceptual framework for a study of this nature is crucial in both artificial intelligence (AI) and educational management for several reasons, especially when aiming for sustainable

national development. By providing a structured approach, a conceptual framework ensures that, AI and educational management efforts are coherent, effective, and aligned with the broader goals of sustainable national development.

Artificial Intelligence

Ahmed (2019), opined that, artificial intelligence (AI) refers to the simulation of human intelligence processes by machines, especially computer systems. These processes include learning (acquiring information and rules for using it), reasoning (using rules to reach approximate or definite conclusions), and self-correction.

Importance of Artificial Intelligence.

Amhed, (2019) advanced the following importance of artificial intelligence,

1. Improved Decision-Making: artificial intelligence provides data-driven insights that enhance decision-making at all levels of educational management.

2. Resource Optimization: Artificial Intelligence helps in the efficient allocation and utilization of resources, reducing waste and improving outcomes.

3. Enhanced Learning Outcomes: By personalizing education, Artificial Intelligence helps improve student engagement, retention, and success rates.

4. Scalability: Artificial Intelligence solutions can scale to meet the needs of growing student populations and complex administrative demands.

Challenges of artificial intelligence

1. Implementation Costs: High initial costs and ongoing maintenance can be barriers for many educational institutions.

2. Data Privacy and Security: Ensuring the privacy and security of sensitive educational data is a critical concern.

3. Resistance to Change: Teachers, administrators, and students may resist adopting new Artificial Intelligence technologies due to fear of the unknown or disruption to established practices.

4. Ethical Considerations: The use of Artificial Intelligence raises ethical questions about bias, fairness, and accountability Amhed, (2019).

Sustainable Development

Luckin (2019) refers to Sustainable National Development as the development that meets the needs of the present without compromising the ability of future generations to meet their own needs, encompassing economic, social, and environmental sustainability.

Sustainable development can be defined as an approach to the economic development of a country without compromising the quality of the environment for future generations. Sustainable development is how we must live today if we want a better tomorrow, by meeting present needs without compromising the chances of future generations to meet their needs. The survival of our societies and our shared planet depends on a more sustainable world (Nwankwo, 2007)

Quality Service Delivery

According to Bialik, and Fadel, (2019) quality service delivery in the context of education refers to the provision of high-quality educational services that meet the needs and expectations of students, parents and society. Quality service delivery in educational management involves ensuring that educational institutions provide high-quality education and support services that meet the needs of students, teachers, and other stakeholders.

Quality service delivery refers to the provision of excellent services that meet or exceed customer expectations. It is a critical factor for the success of any business, including hospitality and tourism industries. The quality of service delivery depends on clean, clear processes that work smoothly and are under continuous review. It is important that all systems work perfectly together and processes flow, and this starts right at the beginning with the first contact from the customer (Unachukwu and Ebenebe 2001).

Curriculum Development

Designing and updating curricula to meet current educational standards and future workforce needs. Curriculum development is a planned, thoughtful and deliberate course of actions that ultimately enhance the quality and impact of the learning experience of students. It includes the development and organization of learning activities designed to meet intended learning outcomes. It also involves the thoughtful assessment of those learning outcomes. The ultimate goal of curriculum is to enhance the quality and impact of the teaching and learning experience. Whether designing a course or a program of studies, there are a number of things that must be considered to create meaningful learning experiences. Curriculum development moves beyond

a content-centered approach to one that considers the relationship between the course/program learning outcomes, assessment of those outcomes, and the activities and opportunities designed to facilitate student learning. Teacher professional development is any type of continuing education effort for educators.

Teacher Training and Professional Development

Teacher professional development is any type of continuing education effort for educators. It's one way teachers can improve their skills and, in turn, boost student outcomes. Learning can take place in formal or informal settings. Formal settings include conferences, courses, seminars, retreats and workshops. Informal opportunities for teacher professional development include independent research or investigation, peer learning initiatives or even just chatting with a colleague in the staff room. Professional development for teachers takes place on a number of different levels: district-wide, among teachers in a given school, or even on a classroom or individual basis (Alper, and Goggin, 2017).

Assessment and Evaluation

Regularly assessing educational programs and student performance to identify areas for improvement. Evaluation is a process of judging someone based on their importance, knowledge, and merit using rules and methods. Assessment is the recording and interpreting of various data to obtain an appropriate measure of skills, knowledge, and attitude to improve the individual's overall performance.10 Jun 2024 Assessment is feedback from the student to the instructor about the student's learning. Evaluation uses methods and measures to judge student learning and understanding of the material for purposes of grading and reporting. Evaluation is feedback from the instructor to the student about the student's learning (Baker, and Inventado, 2014).

Statement of the Problem

It is expected that the application of Artificial Intelligence in educational management practices has the potentials of enhancing quality service delivery in the education sector which is geared towards achieving sustainable national development. These expectations as opined by Holmes, W, Bialik, M, and Fadel, C. (2019) include: Curriculum Development which is the process of creating, designing and implementing a curriculum for educational programmes, courses and training sessions. Teachers Training and Professional Development, this refers to the process of equipping teachers with necessary skills, knowledge and competencies to effectively curriculum content and achieve learning objectives as well as student support services.

Assessment and Evaluation, these are crucial processes in education that helps measure students learning and programme effectiveness. It gives equal opportunities for all students, regardless of background or ability. Although, many disagree on whether these actually constitute artificial intelligence. Instead, some argue that much of the technology used in the real world today actually constitutes highly advanced machine learning that is simply a first step towards true artificial intelligence.

However, despite the perception of a perceived relationship between artificial intelligence and quality service delivery in the education sector in Rivers State owned universities, quality service delivery seems to be sighted at a distance from the school system as the quality of curriculum developed by teachers seems to be alien to the gap it is aimed to fill, teachers professional training and development programmes are not handing down what teachers are required to learn. Assessment and evaluation that is expected to measure students learning outcomes are also not measuring what it is supposed to measure. This brings us to curiosity as to why the gap between the variables and quality service delivery.

Purpose of the Study

The purpose of this study are as follows:

1. To examine the relationship between artificial intelligence and curriculum development in educational management departments in Rivers State owned universities for sustainable national development.
2. To examine the relationship between artificial intelligence and teachers training and professional development in educational management in Rivers State owned universities for sustainable national development.
3. To examine the relationship between artificial intelligence and assessment and evaluation in educational management in Rivers State owned universities for sustainable national development.

Research Questions:

1. What is the relationship between artificial intelligence and curriculum development in educational management in Rivers State owned universities for sustainable national development?
2. What is the relationship between artificial intelligence and teachers training and professional development in educational management in Rivers State owned universities for sustainable national development?

3. What is the relationship between artificial intelligence and assessment and evaluation in educational management in Rivers State owned universities for sustainable national development?

Hypotheses

1. There is no significant relationship between artificial intelligence and curriculum development in educational management in Rivers State owned universities for sustainable national development.

2. There is no significant relationship between artificial intelligence and teachers training and professional development in educational management in Rivers State owned universities for sustainable national development.

3. There is no significant relationship between artificial intelligence and assessment and evaluation in educational management in Rivers State owned universities for sustainable national development.

Methodology

The methodology outlines the research design, methods and procedures that were employed to investigate the relationship between artificial intelligence (AI) and quality service delivery in educational management for sustainable national development. It includes descriptions of the research design, population, sampling techniques, data collection methods, data analysis procedures and data collection method.

The most appropriate design that was used for this study was the correlational survey design. The choice of this design is premised on its basic features as it seeks to study the relationship that exists between two or more variables. Correlation is the degree, strength and direction of a linear relationship between variables (Hedge, N.D).

The population of this study was made up of the two Rivers State owned universities namely; Rivers State University (RSU) and Ignatius Ajuru University of Education (IAUOE). All the 82 academic staff members of the department of educational management in the two universities (43 from RSU and 39 from IAUOE) were used as the population of the study. (School records, 2024).

The census sampling was used to determine the sample of this study, therefore, 82 members of staff in the department of educational management of the two Rivers State Government owned Universities made the sample of the study. The instrument that was used for data collection was

the Artificial Intelligence and Quality Service Delivery Questionnaire (AIQSDQ). The researcher used the above-mentioned questionnaire for the collection of data from respondents. To ensure the validity of the study, copies of the instrument titled; Artificial Intelligence and Quality Service Delivery Questionnaire (AIQSDQ) were given to research experts in measurement and evaluation departments of the sampled universities for necessary corrections which was adhered to strictly.

To ascertain the reliability of the study, The Cronbach Alpha method was used, 20 respondents were selected from the population that were not part of the sample, the researcher administered the instrument on them and retrieved after their response. Data gotten from the respondents were analyzed using Cronbach Alpha statistics.

Data for this study were collected through the administration and collection of the instrument titled; Artificial Intelligence and Quality Service Delivery Questionnaire (AIQSDQ) by the researcher and two research assistants to the sampled population.

Data that were collected in the course of this study were analyzed with relevant statistical tools. The Pearson Product Moment Correlation Coefficient formula (r) was used to answer the research questions while the z-ratio was used to test the hypotheses at 0.05 level of significance.

Results

Research Question 1: What is the relationship between artificial intelligence and curriculum development in educational management in Rivers State owned Universities for sustainable national development?

S/N	ITEMS	Male		Female		
		X	SD	X	SD	DECISION
1	Artificial intelligence enhances faster development of curriculum	3.77	2.14	3.05	2.12	Agreed
2	Artificial intelligence aids the speedy inculcation of curriculum content	3.86	1.59	3.50	1.21	Agreed
3	Curriculum developed using artificial intelligence are richer in content than other curriculums developed without artificial intelligence	3.69	1.60	3.90	2.48	Agreed
4	Schools using the services of A.I in the development of curriculums are always ahead of schools developing curriculum without artificial intelligence	4.01	2.33	3.77	0.87	Agreed

Table 1 above revealed that, items on serial numbers 1, 2, 3 and 4, or all the items presented on table 1 above were agreed by the respondents. This implies that, artificial intelligence enhances the development of curriculum faster. Artificial intelligence also aids the speedy inculcation of curriculum content. Results from the findings further revealed that curriculum developed using the services of Artificial Intelligence are richer in content than others developed without artificial intelligence and finally, schools using artificial intelligence in the development of curriculum are always ahead of other schools without artificial intelligence.

Research Question 2: What is the relationship between artificial intelligence and teacher training and professional development in educational management in Rivers State owned Universities for sustainable development?

S/N	ITEMS	Male		Female		
		X	SD	X	SD	DECISION
5	Teachers training and professional development becomes more effective with artificial intelligence	3.32	1.33	3.05	1.05	Agreed
6.	Application of artificial intelligence in teacher training and professional development programmes enhances teachers quality	3.88		3.10	2.22	Agreed
7.	Artificial intelligence propelled teachers' development and enhances teachers professionalism	8.19	2.23	3,.32	0.99	Agreed
8.	Students in schools where teachers are trained with the application of artificial intelligence tends to perform better than students in schools where teachers are trained without the application of artificial intelligence	4.07	3.02	3.91	2.11	Agreed

Table 2 above shows that, items 5, 6, 7 and 8 were strongly agreed by the respondents on the grounds that, teachers training and professional development becomes more effective with the application of artificial intelligence in teachers training and professional development programmes enhances teacher's quality. The findings further reveals that, artificial intelligence propelled teachers development and enhances teachers professionalism and finally, students in schools where teachers are trained with the application of artificial intelligence tends to perform better than students in schools where teachers are trained without the application of artificial intelligence.

Result Question 3: What is the relationship between artificial intelligence and assessment and evaluation in educational management in Rivers State owned universities for sustainable national development?

S/N	ITEMS	Male		Female		
		X	SD	X	SD	DECISION
9	The application of artificial intelligence enhances accuracy in the evaluation process of school records	3.20	1.15	3.42	0.48	Agreed
10	The application of artificial intelligence brings about a perfect assessment process	3.83	0.99	3.54	3.65	Agreed
11	Teachers with the knowledge of artificial intelligence in assessment and evaluation stand out amongst their peers.	3.11	1.83	3.76	3.10	Agreed
12	The application of artificial intelligence skills in the process of assessment and evaluation reduces stress for teachers.	3.50	2.98	3.17	2.08	Agreed

Result from table 3 above presents the opinions of the respondents on items 9, 10, 11 and 12. The respondents agreed to all the items on table 3 above. In their collective view, the respondents agreed that, the application of artificial intelligence enhances accuracy in the evaluation process. The application of artificial intelligence brings about a perfect assessment process. Teachers with the knowledge of artificial intelligence in assessment and evaluation stand out amongst their peers and the application of artificial intelligence in assessment and evaluation reduces stress for teachers.

Hypothesis 1: There is no significant relationship between artificial intelligence and curriculum development in educational management in Rivers State owned universities for sustainable national development.

Table 4; Z-ratio test of the relationship between artificial intelligence and curriculum development in educational management at 0.05 level of significance.

Respondents	N	$\bar{x}$	SD	df	Z cal	Z crit	Decision
Male	31	15.2	6.68	80	1.82	1.96	Hypothesis Rejected
Female	51	17.23	66.8				

Results from table 4 revealed that, male teachers have mean and standard deviation scores of 15.23 and 6.68 while female teachers have mean and standard deviation scores of 17.23 and 6.68 respectively. With degree of freedom of 80, the calculated Z - ratio of 1.82 is less than the Z -critical value of 1.96, therefore the null hypothesis was rejected. This implies that there is significant relationship between artificial intelligence and curriculum development.

Hypothesis 2: There is no significant relationship between artificial intelligence and teachers training and professional development in educational management in Rivers State owned universities for sustainable national development.

Table 5: Z - ratio test of the relationship between artificial intelligence and teacher training and professional development in educational management in Rivers State owned universities for sustainable development.

Respondents	N	$\bar{x}$	SD	df	Z cal	Z Crit	Decision
Male	31	14.37	6.37	80	1.54	1.96	Hypothesis Rejected
Female	51	15.14	7.01				

Results from table 5 shows that male teachers have a mean and standard deviation scores of 14.37 and 6.37 while female teachers have a mean and standard deviation scores of 15.14 and 7.01 respectively. With degree of freedom of 80, the calculated Z - ratio of 1.54 is less than the Z - critical value of 1.96, therefore, the null hypothesis was rejected.

This means that, there is significant relationship between artificial intelligence and teacher training and professional development.

Hypothesis 3: There is no significant relationship between artificial intelligence and assessment and evaluation in educational management in Rivers State owned universities for sustainable national development.

Table 6: Z - ratio test of the relationship between artificial intelligence and assessment and evaluation in educational management in Rivers State owned universities for sustainable development.

Respondents	n	$\bar{x}$	SD	Df	Z cal	Z Crit	Decision

| Male | 31 | 13.64 | 9.31 | | | | Hypothesis Rejected |
| Female | 51 | 13.82 | 5.18 | 80 | 1.04 | 1.96 | |

Results from table 6 shows that, there is significant relationship between artificial intelligence and assessment and evaluation. This is because the mean and standard deviation scores of male teachers are 13.64 and 9.31 while female teachers mean and standard deviation scores are 13.82 and 5.18 respectively. With a degree of freedom of 80, the calculated Z - ratio of 1.04 is less than the Z - critical value of 1.96, therefore, the null hypothesis was rejected.

Discussion of Findings

Major findings of the study shows that, artificial intelligence enhances curriculum development faster, artificial intelligence application aids speedy inculcation of curriculum content. Most curriculums developed with the application of artificial intelligence are richer in content than others developed without the use of artificial intelligence, as well as schools using the services of artificial intelligence in the development of curriculums are mostly ahead of schools developing curriculum without artificial intelligence.

Further findings from the study revealed that, teachers training and professional development becomes more effective with artificial intelligence, artificial intelligence propelled teacher development enhances teacher professionalism.

Application of artificial intelligence in teachers training and professional development programmes enhances teacher's quality and of course, students in the institutions where teachers are trained with the application of artificial intelligence tends to perform better than students who are in the institutions where teachers are not trained with the application of artificial intelligence.

Results from the findings of the study further revealed that, the application of artificial intelligence enhances accuracy in the evaluation process of school records, it also brings about a perfect evaluation process of students work. Teachers with the knowledge of artificial intelligence in assessment and evaluation stands out amongst their peers and finally, the application of artificial intelligence skills in the process of assessment and evaluation reduces stress.

Conclusion

The study concluded that, artificial intelligence application is key to quality service delivery in educational management and all other sectors of administration particularly in Rivers state owned universities system.

Recommendation

Based on the findings of the study, the researcher recommends thus-

i.   Artificial intelligence application should be introduced during curriculum development process to achieve optimal productivity.

ii.   Organisers of teacher training and professional development programmes should encourage the application of artificial intelligence at all times.

iii. Assessment and evaluation is very key to educational management service delivery, it is therefore recommended for all assessment and evaluation activities.

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Influence of Application of Blended Learning for Sustainable Development in Rivers State Owned Universities

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Abstract

This paper examines the Influence of Application of Blended Learning for sustainable Development in Rivers State owned Universities. Three objective, three research questions and three hypotheses were posed to guide the study. The population for the study was 1,396 students from Rivers State University and Ignatius Ajuru university of Education. The sample for this study consists of 30 percent of the total population making a total of 419 drawn from the institutions under study. The sampling technique used for this study was simple random sampling techniques as all the respondents were given equal opportunity. Data for the study were collected by means of questionnaire titled "Influence of Application of Blended Learning for sustainable Development in Rivers State Universities (IABLSDQ). The IABLSDQ adopted a modified four-point Likert scale of Very High Extent to Very Low Extent. Cronbach Alpha was used for the reliability test which yielded reliability co-efficient of 0.83. Four Hundred and nineteen (419) copies of questionnaire were distributed, and 408 were retrieved for analysis. Mean and Standard Deviation were used to answer the research questions, while z-test was used to test the hypotheses. Based on the findings, it was revealed that flipped classroom method provides better resource materials for learning about sustainable development. It was concluded that the implementation of blended learning presents a transformative opportunity for fostering sustainable development in universities. It was recommended that Universities should prioritize upgrading their technological infrastructure to support blended learning. Regular training, workshops and certification courses can equip users with the necessary skills to effectively utilize digital tools and platforms.

Keywords: Blended Learning, Sustainable development, Flipped classroom, Learning management system, Computer-Based Training (CBT)

Introduction

Technology is the branch of knowledge that deals with the creation and use of technical means and their interaction with life, society and the environment, drawing upon such subjects as industrial arts, engineering, applied science, and pure science. Blended learning systems can take many forms, such as flipped classrooms, learning management system, hybrid courses, and mixed-mode learning, but all these involve the integration of digital learning components with face-to-face instruction. Blended learning can contribute to each of these dimensions by

enhancing educational access, quality, equity improving learning outcomes, employability and reducing the environmental impacts of educational activities (Ramalingam, Yunus & amp; Hashim 2022). Blended learning can contribute to building sustainable development by increasing access to education (Caird & amp; Roy, 2019). Blended learning, which allows students to access educational resources and interact with teachers and peers online, can help bridge this gap by providing access to a wider range of educational opportunities (Chen, 2022). Blended learning can contribute to building sustainable development by fostering collaboration and community- building among students. Blended learning can contribute to building sustainable communities by reducing education's environmental impact.

Blended learning supports this by providing learners with access to educational content anytime and anywhere, thus accommodating diverse learning styles and schedules. This accessibility is crucial in regions with limited educational infrastructure, enabling equitable access to quality education and bridging the digital divide. Blended learning plays a significant role in reducing the environmental impact of education. Blended learning is a term used to represent both teaching and learning processes that combine online learning with in-class learning. Blended learning is a learning encounter in which face to face or the traditional teacher-learner instruction is combined with technology mediated instruction, (Bupo, 2019; Lalima & Dangwal 2017, Noni, Abdullahi & Ismail, 2017). Blended learning may be in the form of a flipped classroom where students learn content online by watching video, lectures, usually at home and homework is done in class with teachers and students discussing and answering questions (Adirika & Ikwuka, 2020). Blended learning has various models which include rotation model, flex model, self-blend model and enriched-virtual model. The integration of technology into educational system has brought blended learning to the limelight as it is gaining popularity among students.

Blended learning as an educational approach combining online digital media with traditional classroom methods has emerged as a pivotal strategy for achieving sustainable development goals. This model integrates the strengths of both face-to-face instruction and digital resources, creating a flexible and adaptive learning environment. Garrison and Kanuka (2020) Blended learning fosters higher-order thinking skills by encouraging active and collaborative learning. Blended learning facilitates the integration of sustainability concepts into various disciplines. Allen and Seaman (2019) Institutions that adopt blended learning report improved student engagement and satisfaction, underscoring its potential to foster a deep understanding of

sustainability issues. Blended learning not only enhances the learning experience but also promotes the efficient use of resources, contributing to sustainable development.

Sustainable development in Rivers State universities is essential for fostering long-term growth and enhancing the quality of education in the region. It involves creating an educational ecosystem that balances economic, social, and environmental considerations to meet the needs of present and future generations. Universities can equip students with the skills and knowledge needed to address the complex challenges of the 21st century, thereby contributing to the overall development of Rivers State. Sustainable development in higher education involves creating an ecosystem that balances economic, social, and environmental goals to meet current and future needs. Integrating technology in education through blended learning can significantly contribute to this balance by promoting efficient use of resources, reducing environmental impacts, and fostering innovation. Blended learning and sustainable development can propel universities towards becoming hubs of innovation and resilience. Universities in Rivers State cannot only enhance educational outcomes but also contribute to the broader goals of sustainable development. This alignment will prepare students to tackle the multifaceted challenges of the modern world, ensuring that higher education serves as a catalyst for long-term societal progress and environmental sustainability. This implies that, there is need to examine the Influence of Application of Blended Learning for sustainable Development in Rivers State Universities with references to students from Rivers State University and Ignatius Ajuru university of Education

Blended learning is a powerful tool for advancing sustainable development. Its flexibility, environmental benefits, support for lifelong, inclusive education, economic advantages, adaptability, and promotion of global collaboration make it an effective strategy for building a sustainable future. Blended learning not only enhances the quality of education but also aligns with the principles of sustainability, ensuring that educational practices contribute positively to the long-term well-being of individuals and societies. Blended learning also supports sustainable development by fostering inclusive education. It provides opportunities for marginalized groups, including individuals with disabilities, to participate in the learning process. Blended learning adaptability to various educational contexts is another critical factor in its contribution to sustainable development. It can be customized to suit different levels of education, from primary to tertiary, and tailored to various cultural and socio-economic settings. This versatility ensures that blended learning can effectively address the unique challenges and

opportunities in diverse communities, promoting localized sustainable development initiatives Boelens, De Wever, and Voet, 2017). Blended learning encourages the development of a global learning community. Through online platforms, students and educators can connect with peers and experts worldwide, facilitating the exchange of knowledge and best practices in sustainability Bonk and Graham (2006), asserts that, the collaborative nature of blended learning promotes cultural understanding and cooperation, essential elements for achieving sustainable development goals. Flipped Classroom for Sustainable Development

The flipped classroom, where traditional lecture and homework elements are reversed, offers significant potential for improving sustainable development in education. Flipped classroom engage students with instructional content at home via videos or online resources and utilizing classroom time for interactive and application-based learning. The flipped classroom promotes active learning and critical thinking skills. According to Bishop and Verleger (2019), the flipped classroom model enhances student engagement and learning outcomes by allowing for more personalized instruction and collaborative activities during class time, which are essential for fostering the skills needed for sustainable development.

Learning Management System (LMS) for Sustainable Development is a digital platform that helps teachers and instructors deliver online learning content. It can provide a variety of tools, such as course creation, student enrolment, progress tracking, and grading. The use of Learning Management Systems (LMS) plays a crucial role in improving sustainable development by providing an efficient and scalable platform for delivering education and training. LMS platforms enhance sustainable development by fostering inclusive and equitable access to education. They provide opportunities for learners in remote or underserved areas to access high-quality educational content and engage in collaborative learning experiences, bridging the digital divide. LMS features such as discussion forums, virtual classrooms, and assessment tools support interactive and adaptive learning, catering to diverse learning needs and preferences. This inclusive approach ensures that more individuals can acquire the skills and knowledge necessary for sustainable economic growth and social development. Graf and List (2015), posits that, LMS platforms not only improve the efficiency and effectiveness of the learning process, but also contribute to building a knowledgeable and skilled workforce equipped to address the challenges of sustainable development.

Computer-Based Training for Sustainable Development Computer-Based Training (CBT) significantly enhances sustainable development by providing a flexible, scalable, and

environmentally friendly approach to education and skill development. CBT allows learners to access educational content at their own pace and convenience, eliminating the need for physical classrooms and reducing the associated carbon footprint.

Ghirardini (2011), opined that Computer-Based Training (CBT) not only reduces the environmental impact but also lowers the cost of training by cutting down on travel, accommodation, and material expenses, making education more accessible and affordable. Computer-Based Training (CBT) supports sustainable development by fostering continuous learning and skill acquisition, which are essential for adapting to the evolving demands of the modern workforce. (Johnson, Hornik, Salas 2008), Computer-Based Training (CBT) enhances learning outcomes and retention rates, which are critical for building a knowledgeable and skilled workforce capable of driving sustainable development initiatives

Statement of the Problem

Blended learning, which combines traditional face-to-face instruction with online educational activities. However, its implementation faced several challenges. Many universities in Rivers State lack the necessary technological infrastructure, such as reliable internet connectivity, modern computer labs, and sufficient digital resources to effectively support blended learning. This infrastructural deficit hampers the seamless integration of online and offline educational components, thereby limiting students access to comprehensive learning experiences.

There is a significant gap in digital literacy among students in universities. Many educators and students are not sufficiently trained in using digital tools and platforms, which can lead to inefficiencies and frustrations in the learning process. This gap in digital literacy also affects the quality of online content delivery and engagement, making it difficult to achieve the intended educational outcomes of blended learning. Lastly, the socio-economic challenges faced by many students in Rivers State exacerbate the problems of blended learning. Students from low-income backgrounds may lack access to personal computers, smartphones, or stable internet connections at home, creating a digital divide that hinders equal participation in blended learning programs. This disparity can lead to unequal learning opportunities and outcomes, undermining the goal of using blended learning to promote sustainable development. The current study therefore sought to fill the existing research gap and also provide a better understanding through the empirical evidence of Influence of Application of Blended Learning for sustainable Development in Rivers State owned Universities

Aim and Objectives of the Study

The main aim of this study was to examine the Influence of Application of Blended Learning for sustainable Development in Rivers State owned Universities. Specifically, the study seeks to:

1. Ascertain the extent to which Flipped classroom influences sustainable development in Rivers State owned Universities.

2 Ascertain the extent to which Learning Management System influences sustainable development in Rivers State owned Universities.

3 Ascertain the extent to which Computer-Based Training influences sustainable development in Rivers State owned Universities.

Research Questions

The following research questions were guided this study:

1. To what extent does Flipped classroom influence sustainable development in Rivers State owned Universities?

2. To what extent does Learning Management System influence sustainable development in Rivers State owned Universities?

3 To what extent does Computer-Based Training influence sustainable development in Rivers State owned Universities?

Hypotheses

The following hypotheses was formulated and tested at 0.05 level of significance to guide this study:

1. There is no significant difference in the mean ratings of education students in Rivers State owned Universities on the extent to which Flipped classroom influence sustainable development

2. There is no significant difference in the mean ratings of education students in Rivers State owned Universities on the extent to which the use of Learning Management system influence sustainable development.

3. There is no significant difference in the mean ratings of Education Students in Rivers State Universities on the extent to which the use of Computer-Based Training influence sustainable development.

Methodology

The study adopted a descriptive survey research design which sought to collect data on the opinions of the participants with a view to analyzing the Influence of Application of Blended Learning for sustainable Development in Rivers State owned Universities.

The population for the study was 1,396 (One thousand three hundred and ninety-six) final year students in Rivers State education Universities. Simple random sampling technique was used to sample 419 final year education students for the study. The instrument used for conducting the study was a self-structured questionnaire titled 'Influence of Application of Blended Learning for Sustainable Development in Rivers State owned Universities Questionnaire (ABLSDQ)' designed by the researcher on a 4-point scale of Very High Extent (VHE), High Extent (HE), Low extent (LE) and Very Low Extent (VLE) weighted 4,3,2 and 1 respectively. The face and content validation of the instrument was established by three experts, two in Department of Educational Management and one in Measurement and Evaluation. Cronbach alpha was used to determine the reliability of the instrument. This yielded a high reliability coefficient of 0.83, 0.84 and 0.85 for Parts A and B respectively. 419 copies of the questionnaire were distributed by the researcher together with two research assistants, who were briefed on how approach the students in filling the copies of the questionnaire. 408 copies of questionnaire were properly filled and returned, representing 95% returns. The research questions were analzed using mean and standard deviation. The mean responses on the research questions were adjudged on the following basis of any mean score that falls below 2.50 will be taken as disagreement and any mean score of 2.50 or above will be taken to indicate agreement. The statistical tool used for the hypotheses testing was the z-test statistical tool and decisions for the hypotheses were made according to the decision rule of z-test.

Results

Research Question 1: To what extent does Flipped classroom influence sustainable development in Rivers State owned Universities?

Table 1: Mean Ratings on the extent to which the application of Flipped classroom influences sustainable development in Rivers State owned Universities (N = 408)

S/N	Item Statements	IAUE = 154			RSU = 254	
		X	SD	Remarks	X	SD
1.	Flipped classroom approach encourages active participation in sustainable development discussions	3.22	0.81	High Extent	3.04	1.01
2.	Flip allowing students to learn at their	3.15	0.98	High Extent	2.78	1.11

own pace

S/N	Item Statements	X	SD	Remarks	X	SD
3.	Flipped classroom method provides better resources and materials for learning about sustainable development	3.45	0.88	High Extent	2.57	0.96
4.	Flipped classroom setup improves your critical thinking skills related to sustainable development issues	3.47	0.71	High Extent	3.09	0.94
5.	flipped classroom model promotes collaborative learning and teamwork on sustainable development projects	3.01	1.10	High Extent	3.00	0.95
	Total	**16.3**	**4.48**		**14.48**	**4.97**
	Grand Mean & SD =	**3.26**	**0.89**		**2.89**	**0.99**

Source: Researchers Field Survey, (2024)

Table 1 which was for research question one showed that, all the items were on high extent. The respondents agreed that flipped classroom method provides better resources and materials for learning about sustainable development. flipped classroom setup improves students critical thinking skills related to sustainable development issues. The confirmation was made with a grand mean of 3.26 and standard deviation of 0.89 for IAUE while that of RSU were 2.98 and 0.99 for mean and standard deviation.

Research Question 2: To what extent does the use of Learning Management System influence sustainable   development in Rivers State Universities?

Table 2: Mean Ratings on the extent to which the application of Learning Management System influences sustainable development in Rivers State owned Universities (N = 408)

S/N	Item Statements	IAUE = 154			RSU = 254	
		X	SD	Remarks	X	SD
6.	LMS supports interactive and engaging learning experiences about sustainable development.	3.54	0.59	High Extent	2.93	1.10
7.	LMS facilitates effective collaboration and communication on sustainable development projects.	3.07	1.03	High Extent	3.42	0.85
8.	Learning Management System (LMS) enhances students understanding of sustainable development concepts.	3.52	0.73	V. High Extent	3.54	0.94

S/N	Item Statements	X	SD	Remarks	X	SD
9.	Learning management systems helps lecturers to monitor students' performance	3.49	0.82	High Extent	3.65	0.77
10.	LMS provides better access to resources and materials related to sustainable development	3.25	0.68	High Extent	3.07	1.03
	Total	**16.9**	**3.85**		**16.6**	**4.69**
	Grand Mean & SD =	**3.37**	**0.77**		**3.32**	**0.93**

Source: Field Survey, (2024)

Table 2 which was for research question two showed that all the items were on high extent. The respondents agreed that LMS supports interactive and engaging learning experiences about sustainable development. The confirmation was made with a grand mean of 3.37 and 0.77 while standard deviation of 3.32 and 0.93 for both IAUE and RSU.

Research Question 3: To what extent does the use of Computer-Based Training influence sustainable development in Rivers State owned Universities?

Table 3: Mean Ratings on the extent to which the application of Computer-Based Training influences sustainable development in Rivers State owned Universities (N = 408)

S/N	Item Statements	IAUE = 154			RSU = 254	
		X	**SD**	**Remarks**	**X**	**SD**
11.	CBT gives students greater control of their academics	2.34	0.94	Low extent	3.36	1.02
12.	CBT makes it easier for students to get good grades	3.48	0.69	High Extent	3.11	1.03
13.	CBT facilitates collaboration and communication with peers and instructors on sustainable development projects	3.33	0.82	High Extent	2.61	1.09
14.	CBT promotes self-paced learning and helps students to better grasp sustainable development topics	3.60	0.83	V. High Extent	3.28	0.85
15.	CBT provides better access to up-to-date information and resources related to sustainable development.	3.60	0.72	V. High Extent	3.08	1.01
	Total	**16.4**	**4.00**		**15.4**	**5.00**
	Grand Mean & SD =	**3.27**	**0.8**		**3.09**	**1.00**

Source: Field Survey, (2024)

Table 3 which was for research question three showed that, four items were on high extent, while one item was on low extent. The respondents agreed that CBT makes it easier for students to get good grades. CBT promotes self-paced learning and helps students to better grasp sustainable development topics. The confirmation was made with a grand mean of 3.27 and 3.09 while standard deviation of 0.8 and 1.00 for both IAUE and RSU.

Test of Hypotheses

Hypothesis 1: There is no significant difference in the mean ratings of IAUE and RSU Education students on the extent to which Flipped classroom influences sustainable development in Rivers State Universities

Table 4: **z-test Analysis of Difference in the Mean Ratings of IAUE and RSU students of faculty of education on the extent to which Flipped classroom influenced sustainable development in Rivers State owned Universities.**

Respondents	N	x	SD	Std Decision	df Error	p	z-cal	z-crit
IAUE	154	3.26	0.89					
				0.008	406	0.05	0.41	1.96
Ho								
RSU								
Failed to reject	254	2.89	0.99					

Source: Field Survey, (2024)

The data on table 4 revealed that, the calculated z-test value of IAUE and RSU mean were 3.26 (IAUE) 2.89 (RSU) respectively, while the critical t value was 1.96 at degree of freedom of 406 at 0.05 significance level. Therefore, the null hypothesis was accepted.

Hypothesis 2: There is no significant difference in the mean ratings of IAUE and RSU Education students on the extent to which Learning Management system influence sustainable development in Rivers State owned Universities.

Table 5: **z-test Analysis of Difference in the Mean Ratings of IAUE and RSU students of faculty of education on the extent to which Learning Management system for sustainable development in Rivers State owned Universities**

Respondents	N	x	SD	Std Decision	df Error	p	z-cal	z-crit
IAUE	154	3.37	0.77					
				0.007	406	0.05	0.62	1.96

Ho

RSU
Failed to Reject   254   3.32   0.93

Source: Field Survey, (2024)

The data in table 5 revealed that the calculated z-test value of IAUE and RSU mean scores were 3.37 (IAUE) 3.32 (RSU) respectively, while the critical t value was 1.96 at degree of freedom of 406 at 0.05 significance level. Therefore, the null hypothesis was Accepted.

Hypothesis 3: There is no significant difference in the mean ratings of IAUE and RSU Education students on the extent to which Computer-Based Training influences for sustainable development in Rivers State owned Universities.

Table 6: z-test Analysis of Difference in the Mean Ratings of IAUE and RSU students of faculty of education on the extent to which Computer-Based Training influence sustainable development in Rivers State owned Universities

Respondents	N	x	SD	Std Decision	df	p	z-cal Error	z-crit
IAUE	154	3.27	0.8					
Ho				0.009	406	0.05	0.30	1.96
RSU	254	3.09	1.00					
Failed to Reject								

Source: Field Survey, (2024)

The data in table 6 revealed that the calculated z-test value of IAUE and RSU mean scores were 3.27 (IAUE) 3.09 (RSU) respectively, while the critical t value was 1.96 at degree of freedom of 406 at 0.05 significance level. Therefore, the null hypothesis was accepted.

Discussion of Findings

The findings revealed that flipped classroom method provides better resources and materials for learning about sustainable development. Flipped classroom setup improves students critical thinking skills related to sustainable development issues. This finding is in consonance with Ugwulashi (2011) stated that, Flipping a classroom is not a new phenomenon. Lecturers engage in some sort of curriculum flipping right now. Flipping a classroom is an instructional strategy and a type of blended learning that reverses the traditional educational arrangement by delivering instructional content outside of the classroom and moves activities, including those that may have traditionally been considered homework into the classroom.

The findings revealed that, learning management systems supports interactive and engaging learning experiences about sustainable development. This finding is in Agreement with the view of Goh, Hong, and Gunawan, (2014), who depicted that Learning management systems were designed to facilitate online learning, and now instructors are embracing and appreciating knowledge sharing in the classroom that is educating and preparing adult learners to complete their college education irrespective of where they are Located. In agreement with the view of Adzharuddin and Ling (2013), opined that Learning Management Systems (LMS) are now installed in the majority of higher education institutions. Learning Management Systems (LMS) is one part of the process.

The findings revealed that CBT makes it easier for students to get good grades. CBT promotes self-paced learning and helps you to better grasp sustainable development topics. The finding is in agreement with the view of Owusu et.al., 2010; Thomas, 2001opined that Computer-assisted learning improves the use of the computer as an auxiliary tool in learning, such as writing homework, accessing information using the Internet, and making calculations using various software. In line with the view of Kausar, Choudhry, and Gujjar; 2018; Soe, Koki, and Chang, 2017) opined that, computer- assisted instruction is a teaching method in which the computer is used as an environment in which learning occurs, which strengthens the teaching process and student motivation, which the students' can benefit from according to his/her own learning speed, and which is formed by the combination of self-learning principles with computer technology.

Conclusion

It was concluded that flipped classroom method provides better resources and materials for learning about sustainable development. flipped classroom setup improves your critical thinking skills related to sustainable development issues.

Finally, it was concluded that the implementation of blended learning presents a transformative opportunity for fostering sustainable development in universities, particularly within Rivers State. Blended learning ability to integrate traditional face-to-face instruction with innovative online educational methodologies can enhance the quality of education by making learning more accessible, flexible, and engaging. However, realizing the full potential of blended learning requires addressing critical challenges such as inadequate technological infrastructure, gaps in digital literacy, and socio-economic disparities among students. Overcoming these obstacles demands a collaborative effort from government, educational institutions, and

stakeholders to invest in necessary resources, provide comprehensive training, and ensure equitable access to technology

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Recommendations

1. Universities should prioritize upgrading their technological infrastructure to support blended learning.

2. Management of Universities should organize Regular training workshops and certification courses to provide the necessary skills to effectively utilize digital tools and platforms.

3. Institutions should implement policies that promote access to blended learning for sustainable development of Rivers State Universities.

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