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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 $\bar{X}$	JSS SD	Decision	SSS $\bar{X}$	SSS SD	Decision

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 $\bar{X}$	JSS SD	Decision	SSS $\bar{X}$	SSS SD	Decision
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 $\bar{X}$	JSS SD	Decision	SSS $\bar{X}$	SSS 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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