

Architectural Conservation Assessment: Analyzing Maintenance Protocols to Counter Deterioration in Educational Buildings

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Abstract:

This research looked at how secondary schools in the Ikwerre Local Government Area deal with building upkeep and how it affects the structures' longevity. For the purpose of preventing the degradation of secondary school buildings in the Ikwerre Local Government Area, the study identified the following skills: investigative maintenance, emergency maintenance, predictive maintenance, time-based maintenance, routine maintenance, deferred maintenance, and corrective maintenance. A total of six aims, queries, and hypotheses served to direct the investigation. Located in Rivers State's Ikwerre Local Government Area, this study used a survey research methodology. Every secondary school in the Ikwerre Local Government Area served as the study's population. This resulted in a total of 500 replies, with 300 being public secondary school administrators and 200 being private secondary school administrators. The research used a census sampling approach. The research team in this study employed a structured questionnaire to gather information. "Maintenance Practice Questionnaire (MPSQ)" is the name of the tool. The survey included five-point scales with values of 5, 4, 3, 2, and 1 for each of the following: strongly agree (SD), agree (DA), disagree (D), and strongly disagree (SA). The reliability coefficient of the instrument was 0.68, and it has been face-validated by three specialists. Researchers in the Ikwerre Local Government Area found that secondary school buildings in the area benefited from students' ability to do corrective repair. Among other things, the research found that secondary school buildings in the Ikwerre Local Government Area benefited from students' ability to practise preventative or time-based maintenance. The study's conclusions led to the following recommendations: the Secondary Education Management Board and the Rivers State Ministry of Education should staff secondary schools with trained maintenance and store officers to oversee the upkeep of school buildings and the application of effective maintenance strategies.

Keywords: Maintenance Practice, Deterioration of Secondary School Buildings.

Introduction

The physical location of a school is an integral part of the dynamic process that takes place there while students study. Proper instruction and learning can only take place in structures that are both functional and valuable, not simply any old buildings. Public and private schools in Delta State both have their share of management and maintenance issues, as is evident from a quick inspection of the state's educational facilities today. The terrible condition of the state's educational facilities is the result of several causes. According to Adejimi (2015), lack of maintenance personnel, inadequate training, and ineffective management methods are the major causes of issues in school buildings, rather than location or socioeconomic status. Adenuga (2010) lent validity to Butterfield's remark when he said that keeping them up and defeating the opponent requires good preparation. A question of procedures alone remains.

Nigerian school plant designs should prioritise resource efficiency and cost-effectiveness. Ignoring these factors increases the likelihood that physical plant management will be ineffective. A focus on cost-effectiveness in providing appropriate facilities is an indication of economic consideration (Ohochuku et al., 2023). Efficient school building designs often support this. Some people mistakenly believe that school budgets are all about being cheap or miserly. "Economy in construction includes long-range cost of operation and maintenance as well as initial cost," states Blissett (2014). Using low-quality, likely more expensive, but low-maintenance materials in school construction usually results in buildings that require a lot of maintenance and end up costing more in the long run than they would have otherwise. A less expensive structure will likely decay at a faster pace than an expensive one. Managing the upkeep of an older structure is undeniably more labor-intensive than that of a brand-new one. Any educational facility is considered "operational" the moment the instructional and extracurricular pursuits of students, faculty, and support personnel get underway. The upkeep of school buildings is necessary since these actions initiate the ageing process.

The term "maintenance" refers to the activities carried out with the objective of preserving or restoring all facilities to an acceptable level (British Standard Institution 2019). There are two sides to the coin when it comes to buildings and their upkeep: building maintenance technology and building maintenance management. The term "building maintenance management" refers to a way of organising a maintenance system to address the problem of building upkeep. Not only does it acknowledge the requirement of finding and fixing flaws, but it also acknowledges the need of a programme to reduce maintenance costs and maximise investment benefits. As a result, methods and factors related to money are crucial. Eade (2019) states that the study of building flaws, such as degradation, is the core focus of building maintenance technology. The maintenance demands are a deciding factor in whether or not to do maintenance. Preserving a structure in its original state is the primary goal of maintenance. Other important reasons to maintain a building include keeping it in a condition where it can continue to perform its purpose, keeping it looking nice, and retaining the investment value. Besides, recognising maintenance problems and recommending appropriate solutions are two of the many talents required for efficient maintenance management. In their 2012 article, Ekundayo and Alonge outlined seven approaches to building maintenance: There are many types of maintenance, including corrective, preventative, predictive, conditional, routine, deferred, detective, and emergency.

Performing an aspect of a building's upkeep until it fails or develops flaws is the most basic kind of corrective maintenance. It includes everything, including fixing or replacing a component that has broken down to the point that it can't do its job (Izobo-Martins, 2014). Other names for corrective maintenance include failure-based maintenance and unexpected maintenance. When anything goes wrong or when a user requests it, it usually happens on the fly.

In contrast, time-based or preventative maintenance entails taking all necessary measures to avoid failure (Sherwin, 2020). The drawbacks of corrective maintenance were the impetus for the introduction of preventive maintenance, which aims to lessen the likelihood of failure and forestall unexpected failure. Cyclical maintenance, time-based maintenance, and scheduled maintenance are all terms that describe this approach. It is common practice to do preventative maintenance at regular, set intervals, sometimes in relation to operational time, as per a previously established schedule. Both exterior and interior paint jobs may benefit from this approach. The goal of PM is to identify and address minor issues before they escalate. Through regular inspections and repairs, preventive maintenance ensures that a facility operates at its most efficient state (Yong & Sulieman, 2015).

Conditional or predictive It is said that maintenance is "Maintenance carried out in response to a significant deterioration in a unit as indicated by a change in monitored parameter of the unit condition or performance" (Abduljareem & Fasasi, 2014). The idea behind condition-based maintenance is that the primary motivation to undertake maintenance is when an item's condition or performance changes. In this way, a condition survey may ascertain the best time to do maintenance by revealing the current condition of each building component. This approach to building maintenance involves keeping a close eye on the building's structural components (such as the walls, floors, and roof) and operational machinery (such as the boilers, pumps, and heating system) to determine which parts need fixing before a catastrophic breakdown. In order to fully benefit from condition-based maintenance, it is necessary to regularly monitor an item's state to detect any signs of a transition from normal to abnormal. To achieve this, choose the condition monitoring parameter that best represents the object and keep an eye on any changes using the right tools. Visual inspections are one kind of condition assessment, while more complex inspections use a range of condition monitoring equipment and procedures are another.

According to Ardit and Nawakorawit (1999), routine maintenance include doing general repairs and upkeep on the building. The renter did not request these things, yet they are required for the building's upkeep. Physical problems caused by degradation and the expense of updating buildings to meet standards, such as energy efficiency requirements, accessibility requirements, fire and life safety requirements, and current HVAC standards, are examples of deferred maintenance. They put off the essential maintenance until later, according to (Asiyai, 2012). Possible factors adding time to the delay include owner preferences, component availability, financial constraints, or bad weather.

Devices like smoke detectors and fire alarms may benefit from detective maintenance as they only need to perform when called upon and do not provide feedback when they are malfunctioning (Bello & Loftness, 2010). When assets or equipment unexpectedly break down, emergency maintenance is necessary. These types of maintenance are more challenging to plan since they are unexpected or reactive.

The physical location of the school, however, plays a significant role in facilitating efficient classroom instruction. The National Policy on Education (2013) highlighted the need of having accessible, sufficient, and effective school buildings for teaching and learning within the policy's content. This will ensure that learners can achieve the policy's objectives. The terrible condition of both public and private secondary schools in the Ikwerre local government region has been the subject of many complaints and observations, making this investigation both essential and urgent. According to student feedback, there are certain shortcomings in the current state of school buildings and other instructional facilities (Duyar, 2019). The current management and maintenance status of secondary school buildings, both public and private, is largely attributable, according to Hunter (2010), to the "general delete mentality" that holds that public property is not anybody's property and, hence, does not need upkeep. Public school administrators believe they are "mere passersby" at the schools, according to their research, but private school owners often take precautions to keep school structures from deteriorating too quickly.

School principals have long griped about inadequate funding for facility maintenance. School administrators should be more involved in keeping school facilities in good repair, but it seems they are really unconcerned about this matter. It demonstrates, to a certain degree, that the school administrators are competent in their jobs with regard to the administration and upkeep of school facilities. The upkeep and administration of our educational facilities is of paramount importance. Despite its apparent significance to the attainment of educational objectives, the school building is notoriously one of the most disorganised and poorly managed parts of the school's infrastructure. The purpose of this research was to determine the state of public and private secondary school facilities and the methods used for their upkeep and management. Therefore, in order to achieve the goals of this research, it is necessary to ask: how do public and private secondary school administrators manage and maintain the school buildings? In both public and private secondary schools, who exactly is responsible for the upkeep of the facilities? To what extent do public and FSLC-NCE approaches to managing and maintaining school facilities differ?

Statement of the Problem

Constant disregard from both the government and school officials has left secondary schools in Nigeria with a host of problems, including inadequate school building planning, worsening conditions, outdated design, and capacity utilisation constraints. These have become a major obstacle to the upkeep of school plants in the majority of Nigerian public schools. Ikwerre Local Government Area's public secondary schools, in particular, are in terrible shape, putting pupils through unnecessary hardships both before and after school. Public secondary school plants that are not well-maintained would render the whole school infrastructure useless, which might have a detrimental impact on students' academic performance. Most school grounds in Ikwerre Local Government Area are overgrown with bushes, and inside, you'll find crumbling buildings with leaky roofs, splintered desks and chairs, uneven flooring, and louvred windows. Another cause for concern is the physical structure of some of the schools. The school's setting is boring and unappealing due to the buildings' filth, extreme disrepair, and frequent state of disarray, which creates a very unfavourable learning environment. Few studies have looked at how well-maintained school buildings affect students' academic performance, in contrast to those that have examined elements like school climate, instructional materials, school gates, physical facilities, and infrastructure as components that influence students' learning outcomes. It would seem that there is still a dearth of a solid maintenance culture in the public secondary schools in the Ikwerre Local Government Area. Given the above, the researcher is concerned about the school infrastructure, which includes things like lightning strikes, roofs that have fallen off, laboratories that are in bad shape and have unhealthy facilities like toilets that could make people sick, library facilities that are in bad shape and discourage students from developing a love of reading, and the fact that most school grounds have become overgrown forests, cutting students off from much-needed space for extracurricular activities. The schools are in a terrible condition due to these and many more. All of these terrible things may have happened because of the school's lacklustre maintenance culture, which in turn could have impacted the kids' grades. In light of this major issue, the purpose of this research is to examine maintenance practices with the aim of reducing the decay of secondary school buildings in the Ikwerre Local Government Area.

Aim/Objectives of the Study

The aim of the study is to assess maintenance practice for curbing deterioration of secondary school buildings in Ikwerre Local Government Area. Specifically, the study will determine the following:

1. Assessment of corrective maintenance for curbing deterioration of secondary school buildings in Ikwerre Local Government Area.
2. Assessment of preventive or time-based maintenance for curbing deterioration of secondary school buildings in Ikwerre Local Government Area.

3. Assessment of predictive or condition-based maintenance for curbing deterioration of secondary school buildings in Ikwerre Local Government Area.

Research Questions

The following research questions were formulated to guide the study:

1. What is the corrective maintenance for curbing deterioration of secondary school buildings in Ikwerre Local Government Area?
2. What is the preventive or time-based maintenance for curbing deterioration of secondary school buildings in Ikwerre Local Government Area?
3. What are the predictive or condition-based maintenance for curbing deterioration of secondary school buildings in Ikwerre Local Government Area?

Hypotheses

The following hypotheses were formulated and will be tested at .05 level of significance:

H_01 There is no significant difference between the mean responses of building professionals based on their qualifications in corrective maintenance for curbing deterioration of secondary school buildings in Ikwerre Local Government Area.

H_02 There is no significant difference between the mean responses of building professionals based on their qualifications in preventive or time-based maintenance for curbing deterioration of secondary school buildings in Ikwerre Local Government Area.

H_03 There is no significant difference between the mean responses of building professionals based on their qualifications in predictive or condition-based maintenance for curbing deterioration of secondary school buildings in Ikwerre Local Government Area.

METHODOLOGY

The researchers in this study used a survey methodology. This study's survey research approach is appropriate since it gathered information on secondary school buildings in the Ikwerre Local Government Area and their maintenance practices to prevent their deterioration. Ikwerre Local Government Area, Rivers State, was the site of the research. Participants in the study will consist of secondary school administrators and instructors. Every secondary school in the Ikwerre Local Government Area served as the study's population. Three hundred public secondary school administrators and two hundred private secondary school administrators in the Ikwerre Local Government Area of Rivers State made up the total population size of 500 respondents.

The research will use a census sampling approach. The statistical enumeration approach known as the census method involves studying the whole population. The population is manageable, which is the reason for this. The research team in this study employed a structured questionnaire to gather information. "Maintenance Practice Questionnaire (MPSQ)" is the name of the tool. Sections A–D make up the instrument. The survey included five-point scales with values of 5, 4, 3, 2, and 1 for each of the following: strongly agree (SD), agree (DA), disagree (D), and strongly disagree (SA).

The reliability coefficient of the instrument is .68, and it has been face-validated by three specialists. We used a five-point rating scale with mean and standard deviation to assess the data we obtained from the respondents and answer our research questions. We used a t-test to check whether the null hypotheses were true at the 0.05 level of significance. As a general rule, we rejected the null hypothesis if our computed value was higher than or equal to the number in the table. If, however, the computed value is lower than the table value, we accept the null hypothesis.

Results

Research Question 1: What is the corrective maintenance for curbing deterioration of secondary school buildings in Ikwerre Local Government Area?

Table 4.1: Mean and Standard Deviation of Corrective Maintenance Skills

S/NO	Corrective maintenance skills include	FSLC-NCE			B.Ed-PhD		
		X	SD	RMK	X	SD	RMK
1	Recognized for safety consciousness, efficiency in repairing and performing corrective maintenance on building and facility systems	4.43	.832		3.57	.700	
2	Provide a high level of customer service to facility tenants ensuring complete satisfaction for services provided	4.11	.891		4.29	.785	
3	Performed numerous electrical works to equipment and facility	3.98	.932		3.99	.988	
4	Performed welding works, to equipment and facility	4.09	.925		4.03	.900	
5	Performed carpentry/renovation works to equipment and facility	4.30	.864		4.00	1.057	
6	Performed plumbing works to equipment and facility	3.83	.958		3.89	.999	
7	Performed masonry works to equipment and facility	3.91	1.069		4.21	.870	
8	Performed repairs to equipment and facility	3.75	1.120		4.08	.926	
9	Maintained and serviced facility roofs,	3.91	1.013		4.15	.827	
10	Maintained and serviced facility heating equipment	4.00	.953		4.35	.747	
	Ground Mean	4.03	.60		3.15	.51	

Building professionals with a Bachelor of Science in Education and a Doctorate in Education had a mean range of 3.57-4.35 and a standard deviation of 0.51-1.05. In contrast, those with an FSLC-NCE had a mean range of 3.83-4.43 and a standard deviation of .83-1.12. Based on the results, it seems that the respondents in Ikwerre Local Government Area are rather homogeneous; moreover, the mean value indicates that they are in agreement with the items listed as corrective maintenance to prevent the secondary school buildings from deteriorating.

Research Question 2: What is the preventive or time-based maintenance for curbing deterioration of secondary school buildings in Ikwerre Local Government Area?

Table 4.2: Mean and Standard Deviation of Preventive or Time-Based Maintenance Skills

S/NO	Preventive or time-based maintenance skills include	FSLC-NCE			B.Ed-PhD		
		X	SD	RMK	X	SD	RMK
1	Perform carpentry and drywall repairs before it breaks down	4.27	.833		4.28	.907	
2	replace plumbing system and drywall repair before it breaks down	4.12	.708		4.14	.880	
3	Repair/replaced small electrical fixtures before it breaks down	4.10	.930		4.12	.958	
4	Repair gas appliance before it breaks down	3.98	.905		3.99	.968	
5	replace painting, brazing and soldering before it breaks down	4.03	1.035		3.87	.880	
6	repair on carpentry Interior Trim before it breaks down	4.08	.827		4.29	.832	
7	repair on Exterior Siding before it breaks down	4.09	.899		3.74	1.046	
8	repair Drywall Installation and Minor plumbing before it breaks down	4.19	.934		4.18	.884	
9	Flooring repair/installation before it breaks down	4.21	.855		4.26	.824	
10	repair Minor plumbing and electrical repairs before it breaks down	4.29	.764		4.05	.944	
	Ground Mean	4.13	.55		4.09	.56	

Table 4.2 shows that the mean range of building professionals with an FSLC-NCE was 3.88-4.29 with a standard deviation of .70-1.03, while the mean range of building professionals with a B.Ed-PhD was 3.87-4.29 with a standard deviation of 0.82-1.04. As the mean and standard deviation were rather close, it was clear that the respondents in Ikwerre Local Government Area were in agreement on the need of preventative or time-based maintenance in halting the decay of secondary school buildings.

Research Question 3: What are the predictive or condition-based maintenance for curbing deterioration of secondary school buildings in Ikwerre Local Government Area?

Table 4.3: Mean and Standard Deviation of Predictive or Condition-based Maintenance Skills

S/NO	Predictive or condition-based maintenance skills include	FSLC-NCE			B.Ed-PhD		
		X	SD	RMK	X	SD	RMK
1	Perform carpentry and drywall repairs before it breaks down	4.32	.828		4.04	1.107	
2	replace plumbing system and drywall repair before it breaks down	4.06	.770		4.95	.863	
3	Repair/replaced small electrical fixtures before it breaks down	4.15	.936		4.06	.940	

4	Repair gas appliance before it breaks down	4.18	.882		4.08	.967	
5	replace painting, brazing and soldering before it breaks down	4.26	.859		4.17	.895	
6	repair on carpentry Interior Trim before it breaks down	4.03	.908		4.24	.959	
7	repair on Exterior Siding before it breaks down	4.27	.905		4.23	.936	
8	repair Drywall Installation and Minor plumbing before it breaks down	4.01	.930		4.17	.890	
9	Flooring repair/installation before it breaks down	3.92	.972		4.17	.943	
10	repair Minor plumbing and electrical repairs before it breaks down	3.95	.941		3.98	.947	
Ground Mean		4.11	.58		4.12	.634	

Table 4.3 shows that the mean range of FSLC-NCE building professionals was 3.92-4.32 with a standard deviation of .77-0.97, while the mean range of B.Ed-PhD building professionals was 3.98-4.95 with a standard deviation of 0.82-1.04. The respondents in Ikwerre Local Government Area agreed on the items as predictive or condition-based maintenance to prevent degradation of secondary school buildings, thanks to the tight range of the standard deviation and the mean.

Hypotheses

H_01 There is no significant difference between the mean responses of building professionals based on their qualifications in corrective maintenance for curbing deterioration of secondary school buildings in Ikwerre Local Government Area.

Table 4.7: t-test analysis on Corrective Maintenance

Groups	Mean	SD	N	df	t-cal	t-crit	Decision
FSLC-NCE	4.66	0.35	200				
				498	-1.14	1.96	Accepted
B.Ed-PhD	4.74	0.19	300				

According to Table 4.7, t-cal is lower than t-crit, which is 1.96. This proves that the alternative hypothesis cannot be true. Thus, in the Ikwerre Local Government Area, secondary school buildings are not deteriorating at a significantly different rate depending on the qualification of the construction experts surveyed.

H_02 There is no significant difference between the mean responses of building professionals based on their qualifications in preventive or time-based maintenance for curbing deterioration of secondary school buildings in Ikwerre Local Government Area.

Table 4.8: t-test analysis on Preventive or Time-Based Maintenance

Groups	Mean	SD	N	df	t-cal	t-crit	Decision
FSLC-NCE	4.71	0.27	200				
				498	1.41	1.96	Accepted
B.Ed-PhD	4.62	0.27	300				

Compared to t-crit (1.96), t-cal (1.41) is lower, as seen in Table 4.7. This proves that the alternative hypothesis cannot be true. Hence, in order to limit the degradation of secondary school buildings in Ikwerre Local Government Area, there is no significant difference in the mean replies of building experts based on their credentials in preventative or time-based maintenance.

H_0 There is no significant difference between the mean responses of building professionals based on their qualifications in predictive or condition-based maintenance for curbing deterioration of secondary school buildings in Ikwerre Local Government Area.

Table 4.9: t-test analysis on Predictive or Condition-Based Maintenance

Groups	Mean	SD	N	Df	t-cal	t-cri	Decision
FSLC-NCE	4.72	0.27	200				
				498	0.25	1.96	Accepted
B.Ed-PhD	4.70	0.22	300				

Compared to t-crit (1.96), t-cal (0.25) is lower, as seen in Table 4.9. This proves that the alternative hypothesis cannot be true. Hence, in order to prevent the degradation of secondary school buildings in Ikwerre Local Government Area, there is no discernible variation in the mean replies of building experts according to their degrees in predictive or condition-based maintenance.

Discussion of Findings

Findings showed that respondents in the Ikwerre Local Government Area agreed on the following as necessary repairs to prevent secondary school buildings from deteriorating further. Professionals in the field of building maintenance in the Ikwerre Local Government Area did not significantly vary in their replies when asked about their credentials in preventing the decay of secondary school buildings via corrective maintenance. In accordance with Spending, Holmes and Shen (2015) (Ohochuku et al., 2023), corrective maintenance is performed after a facility has failed, but its failure has been anticipated and preparations have been made for the repair procedure, tools, spares, and replacement. A common breakdown condition on a tractor or machine causes a state of "no operation," and they noted that this makes up the bulk of maintenance work in many industries and organisations, sometimes reaching as high as 95%. It's also typically costly and done in conjunction with other planned maintenance.

In order to slow the decay of secondary school buildings in the Ikwerre Local Government Area, the study's findings showed that the respondents agreed on the following things as time-based or preventative maintenance. When asked how they would stop the decay of secondary school buildings in the Ikwerre Local Government Area, construction professionals gave answers that were similar regardless of whether they were qualified to do preventative or time-based maintenance. This study's findings are in agreement with those of Odediran, Opatunji, and Eghnure (2012), who state that the purpose of preventive maintenance is to identify potential vulnerabilities in a system and fix them before they cause any problems. Combining scheduled maintenance with periodic inspections, the idea is to lower the chance of failures. It is common practice to use a statistical technique for estimating the service life of components and materials. According to Amusan and Bamisile (2012), preventative maintenance is a planned inspection and servicing method that aims to avoid equipment failure and malfunction by identifying and fixing the reasons early on.

In order to slow the decay of secondary school buildings in the Ikwerre Local Government Area, the study's findings showed that the respondents agreed on the following elements as condition-based maintenance and predictive maintenance. When asked how they would prevent the degradation of secondary school buildings in the Ikwerre Local Government Area, construction professionals' answers did not vary significantly according to whether they were qualified in condition-based maintenance or predictive maintenance. Consistent with Shohet and Straub (2013), CBM seeks to

control equipment failure modes, as shown in the research. When establishing CBM, it is important to take into account all possible failure modes that might lead to economic losses. CBM is based on the premise that the majority of failures do not happen all at once and that their emergence may be detected at an early stage of degradation. Finding the best course of action and knowing when to execute maintenance are the two biggest obstacles.

Conclusion

Maintenance constitutes the systematic efforts aimed at preserving or restoring the integrity of all elements comprising a built environment, encompassing structures, infrastructure, and contents, in accordance with prescribed standards (British Standard Institution, 2019). This concept within architectural discourse delineates into two fundamental domains: architectural conservation assessment and building maintenance management. Architectural conservation assessment delineates the structured evaluation of maintenance methodologies to uphold the longevity and integrity of built heritage, aligning with sustainability imperatives. It acknowledges the imperative not only of identifying and rectifying structural deficiencies but also of instituting a comprehensive regimen that minimizes costs and maximizes returns on investment. The study's revelations underscore the necessity of adopting various maintenance modalities, including corrective, preventive (time-based), predictive (condition-based), routine, deferred, detective, and emergency maintenance, to combat the effects of deterioration on secondary school buildings within Ikwerre Local Government Area. This aligns with contemporary sustainability initiatives aimed at fostering the longevity and resilience of built environments.

Recommendations

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

1. **Integration of Architectural Conservation Principles:** Incorporate architectural conservation principles into maintenance protocols for secondary school buildings. This entails conducting regular architectural conservation assessments to identify vulnerabilities and prescribe appropriate maintenance interventions. By integrating conservation principles such as heritage significance, authenticity, and sustainability into maintenance practices, stakeholders can ensure the long-term preservation of educational infrastructure while aligning with global sustainability drives.
2. Support the implementation of long-term, environmentally conscious, and resource-efficient maintenance practices by speaking out in favour of sustainable maintenance solutions. Encourage the implementation of green maintenance practices, including energy-efficient upgrades, water conservation measures, and waste reduction initiatives. Additionally, promote community engagement and capacity-building initiatives to instill a culture of sustainability within educational institutions and local communities.
3. The Ikwerre Local Government Educational Zone needs an educational strategy to direct the upkeep of its school facilities.

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