INFRASTRUCTURAL MAINTENANCE PRACTICES IN SCHOOLS AND ITS IMPACT ON EDUCATION DELIVERY IN GHANA: THE CASE OF SELECTED SCHOOLS IN THE BUILSA SOUTH DISTRICT

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Abstract

The study explored the infrastructural maintenance practices in schools and its impact on education delivery in the Builsa South District. The respondents who were Headmasters, Assistant Headmasters, Parent Teacher Association chairpersons, the District Assembly Engineer as well as the Ghana Education Service officer in-charge of projects were selected purposively. The Cash theoretical model was employed; and semi-structured interview was used to collect data. The data were analysed thematically. Tesults showed that, generally, there was poor maintenance culture of educational infrastructure in schools across the Builsa South District coupled with lack of funds to accomplish same. In addition, majority of the participants revealed that the poor maintenance culture impacted negatively on education delivery. It was also revealed that major chunk of the support for maintenance work in schools was received from Parent Teacher Association. Conclusions drawn were that poor maintenance impacted negatively on education delivery in the Builsa South District. Funding for maintenance of educational infrastructure in schools was received mainly from three sources namely; Parent Teacher Association, Old Students and internally generated funds. The study recommended among others that the District assembly should allocate part of its funds for maintenance work in schools; get Non-Governmental Organizations on board to help in maintaining educational infrastructure.

Keywords: Infrastructure, Maintenance, Education

Introduction

One acquires education in order to ensure smooth and flexible transition to an independent self-sufficient life. Although some people seek their formal education outside the traditional classroom, for example, private tutoring and home schooling, the customary educational institution is the school. In order to facilitate delivery of good education to learners, schools need to be conducive for learning because a high-quality education might not be as accessible in an unfavourable environment, such as a poorly maintained building. One of the critical problems confronting the housing industry in Ghana is the poor maintenance practice (Afranie & Osei Tutu, 1999). Building maintenance is generally considered an unproductive operation by majority of individuals, organizations, institutions and governments. However, it remains one of the most neglected areas in terms of technology in both developed and developing countries (Bennel-Yinteman, 2008). It must be said that deterioration in school buildings and other fixtures are inescapable; for this reason, periodic attention is required to keep them in good state so that they can continue to perform their required functions and also sustain the level of utility and value derived from them. The context for this study assumes that the design, maintenance, and operation of schools and other educational institutions must be taken into account as factors that contribute to a positive learning environment for students and workers (Christopher, 1988).

As school buildings age, there arises a growing challenge of maintaining the nation's education infrastructure at a level that enables teachers to meet the needs of the 21st century learners. According to Cash (1993), a school "is a promise of the future, schools should reflect the environment of success. It is a physical representation of a public message about the value of education" (p. 83) It is in the backdrop of this that Winston Churchill as said, "we shape our buildings; before, our building shape us". (Winston Churchill, n.d., p. 19)

Statement of the problem

The state of physical buildings in the Builsa South District at all levels such as kindergartens, primary, junior high, senior high schools and educational offices today appears to be of great concern to students, parents and all educators. It is in this light that Churchill (1943) is reported to have said that we shape our buildings and thereafter the buildings shape us. Human beings instinctively believe that the physical building has an impact on school management, teaching and learning resulting to good or bad outcomes.

However, the physical environment of the buildings that have been constructed can especially influence the users of the building. This is coupled with the reasons why all stakeholders nationwide are facing increasing demands for accountability regarding student performance. The condition of public-school buildings in Builsa South therefore, need to be assessed to determine whether the maintenance practices on these facilities can aid with such accountability demands. It was in the light of this that the researcher decided to embarked on this study to explore and describe the maintenance practices of school buildings and its impact on education delivery in the Builsa South District.

Purpose of the study

The study was meant to explore school buildings maintenance practices and its impact on education delivery in the Builsa South District.

Research questions

The following research questions were formulated to guide the study:

1. What is the maintenance culture of educational infrastructure in the Builsa South District?
2. What is the impact of school infrastructure maintenance on education delivery in the Builsa South District?
3. What is the source of funding for maintaining educational infrastructure in the Builsa South District?

Review of Related Literature

Maintenance Practices of School Buildings

Building maintenance plays an important role among other activities in building operation. Building defect and damages are part of the building maintenance "bread and butter" as their input indicated in the building inspection is very much justified, particularly as to determine the building performance. The quality and efficiency of maintenance management operation of building depends, to some extent, on the building condition, information available and the expectation from the owners or the organization (Zulkarnain, Zawawi, Rahman & Mustafa, 2011). However, buildings exist largely for the benefit of their occupants and for what goes on in the building. For instance, an office building exists to facilitate administrative functions and on the other hand, a residential flat exists for people to live in, including perhaps some social interactions between residents. The building elements (floor, roofs, walls etc.) exist largely to divide the building's uses one from another and to keep at bay external elements of rain, wind, reptiles etc. Building maintenance therefore needs to be carried out to allow those functions of the building to continue to be carried out, preferably in the way and to the standard of the originally envisaged, designed and built, and at least satisfactorily. It encompasses many operations and functions and can be described as "the effective and efficient utilization of resources to ensure that the process and its facilities are kept operable to a standard required by the users". In the words of Seeley (1987), building maintenance has until recently been a neglected field of technology, being regarded as a "cinderella" activity. It possesses little glamour and is unlikely to attract very much attention and is frequently regarded as unproductive, although many of the managerial and technical problems are more demanding of ingenuity and skill than those of new works.

In a study conducted by Afrane and Osei-Tutu (1999) in Accra, it was revealed that there is a real housing maintenance problem in the country. The study revealed that 43 per cent of all roofs, 42 per cent of painting, 40 per cent of courtyard, 34 per cent of walls, 33 per cent of wooden members, 30 per cent of floor, 25 per cent of sub-structure had maintenance problems. The most widespread maintenance problems identified were faded painting, cracks in walls, leakage of roofs, rotten wooden members and dysfunctional housing facilities and infrastructure. In fact, a considerable proportion of the housing in these cities, especially those in the low-income housing neighbourhoods pose security challenges to the occupants. It is therefore not surprising that from time to time, we hear of collapsing of walls and caving in of roofs resulting in all forms of human casualties.

The concept of building maintenance

RICS Practice Standard (2009), states that building maintenance has for many years been regarded as the "Cinderella" of the building industry, with little attention paid to innovation and "free thinking" in the delivery of its service. However, it should be pointed out that building maintenance is not only key to sustaining the built environment, but its value in terms of employment and expenditure in the

economy is also significant. Maintenance, according to the British Standard -3811 (1993), is defined as, a combination of all technical and associated administrative actions intended to retain an item in, or restore it to a state in which it can perform its required functions. The "actions" referred to are those associated with initiation, organization, and implementation. It envisages two processes: "retaining", that is, work carried out in anticipation of failure, referred to as preventive maintenance and "restoring", that is, work carried out after failure, and it's referred to as corrective maintenance. There is also the concept of an "acceptable standard" which may be construed as acceptability to the person paying for the work, to the person receiving the benefit or to some outside body with the responsibility for enforcing minimum standards.

The committee on Building Maintenance defined ''acceptable standard'' as quoted in the first edition of BS 3811, as "one which sustains the utility and value of the facility" and this is found to include some degree of improvement over the life of a building as acceptable comfort and amenity standards rise. Similarly, the Committee of the Department of Environment (1972) defined building maintenance as Work done in order to keep, restore or improve every facility, that is, every part of building, its services and surrounds, to a currently accepted standard and to sustain the utility and value of the facility. Furthermore, the University of Calgary (2013) identified maintenance as work required preserving or restoring building systems and components to their original condition or to such condition that they can be effectively used for their intended purpose.

Challenges of maintenance management practices

Three considerations for developing maintenance policy are building maintenance objectives, benefits and policies (Armstrong, 1987). The main purpose is to obtain benefits with integration of adequate maintenance policies. It concerns with proper procedures for planning building maintenance activities. Alner and Fellows (1990) states that, safety is the primary concern for the planning of maintenance strategy to ensure building and associated services are in safe condition, fit for use and comply with the law and all statutory requirements. Maintenance work is carried out to maintain the value of the physical assets of the building stocks and quality. Thus, these factors are considered important for development of maintenance policy. However, apart from the value consideration, Burns (1997), argues that there should be ground rules for the allocation of maintenance resources available to management. Maintenance policies are beneficial to the organization as a whole, it must relate to the cost involved for getting maintenance funding. Maintenance strategy is adopted in order to extend the life cycle of buildings and its fittings services. Maintenance personnel choose different maintenance strategies depending on allocation maintenance resources. The maintenance policy is the integration of different strategic approaches, which include corrective, preventive and condition-based maintenance (Horner et al, 1997).

Ollila and Malmipuro (1999) identified that, the main types of categories of maintenance consisted of reactive, preventive, predictive and proactive maintenance. However, Coetzee (1999) argues that the maintenance strategies should be based on the detailed design of the maintenance cycle for different types of organizations. Planned Preventive Maintenance (PPM) has been described as the most effective maintenance strategy against the frequency of breakdown (Seeley, 1976). However, Planned Preventive Maintenance (PPM) is considered an ineffective solution because it makes too early and unnecessary replacement (Spedding, 1987). The argument of this maintenance strategy is becoming the focus of economic downturn, resulting in cutting operation cost to organizations. Tse (2002) argues that maintenance practices in Hong Kong concentrate on time-based and failure-driven strategies, but without adopting a comprehensive maintenance approach, and that maintenance is still in a primitive stage.

The impact of school infrastructure maintenance on education delivery

Prior to this awareness of the relationship between the school environment and student learning, it was felt that the environment only affected the consciousness when it caused particular pleasure, harm, discomfort, or stress. Now increasing evidence argues that an improperly designed physical environment in a school may cause stress to the occupants of the facility, both directly and indirectly (Conners, 1982). Edwards (1991) confirmed the idea that student achievement can be influenced by the school condition and environment. Thus, the trend is moving to where educators and facility planners are considering other dimensions or factors in a school's physical environment that have an influence on those involved – teachers and students in the educational process (Conners, 1982).

Hathaway (1991) asserted that children perceive that their schools reflect important things related to their communities and also believe that good schools help them to make good transitions to life in the community. Until recently, professionals involved in school design have assumed that as long as certain minimum standards for size, acoustics, lighting, and temperature were met, a productive environment existed and teaching and learning would proceed normally (Conners, 1982). However, more recent research has determined that the physical environment and the learning experience cannot be separated and are considered to be integral parts of each other (Taylor & Gousie, 1988). One common topic in school facility planning concerns the relationships between school building conditions and student achievement, and student behaviour (Earthman & Lemasters, 2000). Although both the physical environment and the building conditions have been documented as having an impact on student achievement and behaviour, there have been relatively few studies that examine this issue in great detail (Earthman, 1985; Faust, 1980).

School Building Design

The assumption of those who design schools have been that as long as certain minimum standards for size, acoustics, lighting, and heating were met, a productive environment existed when the teaching-learning process would proceed normally (Conners, 1982). This is because the physical environment and the learning cannot be separated and are considered to be an integral part of each other (Taylor & Gousie, 1988). Christopher (1988) asserted that the purpose of the designed environment is to provide a climate conducive to both teaching and learning. Although it is common knowledge that the fields of both architecture and education understand that there is a connection between school building conditions and student achievement, there has been little specific research to report exactly how and to what extent building influences students' achievement.

McGuffey and Brown (1978) investigated the influence of school building on students' achievement in the fourth, eighth, and eleventh grades in Georgia. They found that the school facility age does affect what students learn, and that this relationship was not related to student socioeconomic status. They used the scores on the Iowa Test of Basic Skills for the fourth and eighth grade students and the Test of Academic Progress for the eleventh-grade students. In comparing the achievement scores with the age of the building, the statistical analyses indicated the building age could account for 0.5% to 2.6 % of the variance in the fourth grade. In the eighth grade, it explained from 0 percent to 2.6 % of the variance and from 1.4 % to 3.3 % in the eleventh grade.

School Building Condition and Student Achievement

The impact of the physical environment on humans, specifically student achievement, is frequently subtle and difficult to measure accurately. Identifying particular physical building factors or conditions, such as lighting, colour, classroom size, air conditioning and determining how they affect student academic achievement can be very complex. Duke (1998) did not deny that students are capable of

learning in spite of any obstacles imposed by the setting, although it is reasonable to want to know what settings or conditions maximize student performance.

Weinstein (1979) reviewed completed research on school facilities. Her review of research covered a broad range of subjects relating to school facilities. The studies she included in her review, which were concerned with the relationship between facility conditions and student achievement, were limited due to a lack of available research during that time period. In the early 1980's, McGuffey (1982) reviewed a body of research in the same general knowledge area. He reviewed a total of 98 research studies, some of which dealt with the influence of classroom environments on student behaviour, attitudes, and achievement. McGuffey's analysis of these studies led to the finding that certain elements of a building do influence student achievement. For instance, he found that, a "lack of proper control of the thermal environment results in inefficient [student] work patterns and discipline problems" (McGuffey, p. 285). His conclusion, which was based upon existing research, was that obsolete and inadequate facilities detract student from learning and that modern and efficient facilities enhance student performance. More recently, Lemasters (1997) worked to synthesize research findings in a way that supported McGuffey's work. Lemasters reviewed over 100 studies covering the years 1982 to 1997 to identify a pool of studies that addressed the relationship between school building condition and student achievement. This research was unique in that all of the studies included in the analysis dealt with the specific relationship between facility conditions and student achievement/behaviour. Out of the 100 studies, Lemasters chose 53 studies that addressed the specific relationship. The author included those studies that specifically dealt with the relationship between school building conditions and student/teacher health and productivity. A highlight of Lemasters' work is that she limited the studies analysed to those that specifically dealt with the possible relationship between school building conditions and student achievement/behaviour. This was a different approach taken - examining a more specific area of research within the general area of school facilities research. Lemasters' findings were more precise than the findings in the two previous reviews of research in that she had a pool of studies that dealt with a specific topic. The author concluded that school facilities indeed have an influence upon student achievement. The majority of the studies analysed reported significant differences in student scores when the students were housed in either adequate or inadequate school buildings. Students in inadequate buildings did not perform as well as students in adequate buildings, especially in math and English achievement tests.

A more recent review of research by Bailey (2009) sheds additional light on the relationship between student / teacher health and performance and school buildings. This research supported the research of Lemasters (1997) and other previous work (Weinstein, 1979; McGuffey, 1982). Bailey (2009) analysed studies on the same relationship between school building condition and student achievement between the years 1997 and 2008. Bailey reviewed 157 separate studies and selected 54 studies for analysis, which specifically considered the relationship between building condition and student achievement. Bailey asserted that the sum of the reviewed research indicated that a positive relationship exists between the condition of the school and the health and performance of students and teachers. This relationship was expressed in the difference in achievement scores of students in buildings assessed as being in either good or poor condition. The difference in student scores ranged from 3% to 17% (Fuselier, 2008; Taylor, 2009).

Sources of funding for building maintenance

Funding is a significant issue which plays a crucial role in educational infrastructure. The government is considered to play a central role in the funding of educational infrastructure maintenance especially public-school buildings in both the developed and the developing world. Simkins (1997)

presents the case in nations like England and Wales that have adopted a combination of centralized and decentralized systems of management for self-administration in schools. The operation of resource management serves as the main target of decentralization of authority to schools. Schools are furnished with a square spending plan (aggregate spending plan for the year) intended to meet all intermittent use. According to Simkins (1997), these schools are allowed to augment this financial plan through their own income generating exercises and the budget is set up by the Local Education Authority and the central government. The obligation to deal with this budget is with the school governors' whiles the government controls local power consumption through block grants, setting standard spending evaluations for every territory. Each Local Education Authority allots a part of its education budget to schools (Russel, 1997).

A careful study of the report titled (Public Education Finances, 2013), by the Economic Reimbursable Surveys Division Reports, United States of America, also revealed that funding public secondary and elementary school education is not a sole responsibly of the central or federal government. This role is played by the federal government, state governments and local governments. This decentralization of public-school funding not only relieves the burden on one party but also ensures continuous flow of funds to manage schools efficiently.

Although the 1992 constitution makes it compulsory for the government to cater for the cost of education from the basic level to the tertiary level, it is now obvious that governments are not ready to shoulder this responsibility alone. Education funding in Ghana has been an issue to contend with. Public schools within the country have consistently been deprived of development, coupled with recurrent expenditure which has rendered them incapable to function at maximum capacity. It is important to note that, managing these scarce funds from the identified source is critical to the successful and smooth running of these public schools. In Ghana, schools and for that matter public schools receive revenue from three main sources, namely Government of Ghana budgetary support, Donor Pool Fund and through Internally Generated Funds (IGF).

Methodology

A case study approach was chosen for the study because according to Denscombe (2007), a case study focuses on instance of a particular phenomenon with the view to providing an in-depth account of events, relationships, experience or processes occurring in that particular instance. Case studies strive to portray 'what it is like' to be in a particular situation, to catch the close-up reality and 'thick description' of participants' lived experiences of, thoughts about and feelings for a situation. They involve looking at a case or phenomenon in its real-life context, usually employing many types of data (Robson 2002: 178). The essence of this design was to allow the researchers explore the maintenance practice of educational infrastructure and its impact on education delivery in the Builsa South District. The populations is estimated at 68 comprising 22 Headteachers, 22 Assistant Headteachers, 22 PTA Chairpersons, one Project Coordinator, District Education Office and the Engineer at the District Assembly in the Builsa South District.

A sample size of 10 was used. This number comprised of two headmasters, four Assistant Headmasters, two Parent Teacher Association chairpersons of the two Senior High schools, the District Assembly Engineer and an officer from GES in-charge of projects from the Builsa South District Assembly. Creswell (2005) asserts that selecting a large number of interviewees for a qualitative research, in particular will result in superficial perspectives. The overall ability of a researcher to provide an in-depth picture diminishes with the addition of each new individual or site (Kusi, 2012). The researchers choose this sample size to avoid difficulty in transcribing, coding and analysing massive amount of data that might be generated by a larger number. The sample was thus selected

purposively. Interview guide was employed for the data collection from all the participants. Data from the interviewees were analysed thematically.

Results and Discussion

Research Question 1: What is the maintenance culture of educational infrastructure in the Builsa South District?

The maintenance culture of educational infrastructure. It emerged from the data collected that there was poor maintenance culture of educational infrastructure across the District arising from lack of funds as one of the participants said;

> *'' ... The moment the buildings are handed over, no one comes back to see their state again. All the District Assembly and Government is interested in is putting up the building and nothing else''. (PHT1)*

Another interviewee was of the view that;

> *'' ... As Ghanaians maintenance is generally our problem in almost all spheres of our lives including the educational sector, I have been a Headteacher here for the past ten (10) years and I can tell you that when it comes to maintenance, we can do little about it. We do not have the money''. (PAHT4)*

Similarly, an interviewee also said;

> *'' ... When it comes to maintenance of our buildings in this school we also do the little we can do, because government is responsible for infrastructure in the educational sector, but when it comes to the small "small" maintenance for our students and staff to feel comfortable, we do and that even comes from PTA, but there are some that are simply beyond our strength''.* (PHT2)

The comments above depicts that there is poor maintenance of educational infrastructure in most of the schools in the Builsa South District. It therefore goes to suggest that whilst others are doing minor maintenance others are not maintaining their buildings. This confirms the position of Zulkarnain, et al (2011), that the quality and efficiency of maintenance management operation of building depends, to some extent, on the building condition information available and the expectation from the owners or the organisation. It further agrees with Tse (2002) that, maintenance practices in Hong Kong concentrate on time-based and failure-driven strategies, but without adopting a comprehensive maintenance approach, and that maintenance is still in a primitive stage.

Research Question 2: What is the impact of school infrastructure maintenance on education delivery in the Builsa South District?

The following analysis came out strongly.

The theme of ''impact of school infrastructure maintenance on education delivery'' came out in the analysis. It emerged from the data collected that there was a link between school infrastructure

maintenance and education delivery in the Builsa South District. As the interviewees rightly asserted through their responses below;

> *'' ... The condition of most of our buildings does not merit Students to sit in and learn in them but what do we do? Sometimes when there are rains teachers would have to abandon classes because the roof leaks and the raindrops too come into the classes through the windows into the clas''s. (PAHT 3)*

> *'' ... Sometimes students who have been placed here get discouraged when they come to see some of the structures on our campus. I am sure that sometimes our children do not do well because of the state of the buildings here''. (PPTA2)*

From the analysis, it could be inferred that there appears to be a link between school building maintenance and academic achievement. This affirms Mwamwenda and Mwamwenda (1987) assertion that there is a relationship between the condition of school buildings and student achievement in developed and developing countries, they concluded that students in these developing countries perform much below those in developed countries because of the inadequate and poor school facilities.

Research Question 3: What is the source of funding for maintaining education infrastructure in the Builsa South District?

The following themes came out strongly from the analysis;

On sources of funding for maintaining education infrastructure in the Builsa South District, it was realised from the data that there were several sources of funding for maintaining education infrastructure. When the respondents asked what were sources of funding, they gave following comments.

The respondents said:

> *''... For the past years the Parent Teacher Association has been our backbone when it comes to some kinds of maintenance, especially a whole building maintenance''. (PHT1)*

> *''... Frankly speaking, the PTA has been very helpful when it comes to maintenance in this school''. (PAHT1)*

> *''... Most often too, we are able generate some income in the school and that is what we rely on when it comes to maintenance work like lighting and some others''. (PHT2)*

> *''... At times groups come to use our facilities when the students are on holidays and we charge them some small amount, sometimes that is what we rely on, when it comes to maintenance''. (PAHT2)*

From the above responses it could clearly be seen that most schools receive funding from three main sources for maintenance work and that is from old students, Parent Teacher Association and Internally Generated Funds. This agrees with Weismann and Jütting (2001), viable public schools depend much on their ability to generate funds that would meet their financial obligations. The funds collected from both formal and informal sector and other financial support from the internal and external are the main sources of revenue for the Schools. The financial obligation of the public schools may include

the expenditure on general maintenance of the school as well as administrative costs. That is, Public schools are funded from a range of different sources. Governments mainly fund schools but it must be noted that Parent Teacher Association (PTA) and other private (non-government) organizations provide schools with funds for constructional activities.

Conclusions

From the findings of the study, it became evident that most schools had no maintenance plan for their buildings. It also became very clear that poor maintenance impacted negatively on education delivery in the Builsa South District. It was further revealed that funding for maintenance of educational infrastructure in schools was received from mainly from three sources, namely; parent teacher association (PTA), old students and internally generated funds (IGF).

Recommendations

The following recommendations are made to improve the maintenance culture of educational infrastructure in schools in the Builsa South District.

- It emerged from the study that most schools appeared to have carried out little or no maintenance at all for the past few years. The District assembly should therefore allocate part of its funds for maintenance work in schools.
- It emerged from the study that there was poor maintenance culture in schools in the Builsa South District and that impacted poorly on education delivery. It is therefore recommended that students of schools that has poor maintenance culture should be given guidance by the Guidance and Counselling Unit of Ghana Education Service to let them know that what they want to become in the future is tied to their ability to learn and pass but not the school buildings per se. It is further recommended that schools adopt a resilient attitude for school maintenance culture.
- The study revealed that there are three main sources of funding for maintenance of education infrastructure in the Builsa South District. It is therefore recommended that Non-Governmental Organizations, philanthropist and well-meaning Ghanaians get on board to help in maintaining educational infrastructure in schools. School management should establish channel of communication with teachers and students about school building conditions and have an effective mechanism in place to deal with these problems and address them quickly. This will improve teachers and student's morale by letting them know that their comfort and wellbeing is a priority of management.

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