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## ARCHITECTS' APPROACH TO ENHANCING QUALITY EDUCATIONAL BUILDING ENVIRONMENT

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### ABSTRACT

*This paper examined identifiable indoor environmental conditions required of all high performance schools. It emphasized that student and teacher comfort is indicated as the most important aspect of any school environment and mainly dependent on the quality of architectural design and maintenance of educational facility for maximum teaching and learning. It highlighted essential environmental consideration of schools, as it affects performance of both teachers and students and design criteria for a healthy school building. It concluded that providing a quality school environment that is transformed from a state of hopeless deterioration to a healthy condition will affect the attitudes of the students and teachers and turn them energetically positive in both teaching and learning.*

**Keywords:** *Environmental, Performance, Architectural, Schools, Building Conditions*

### INTRODUCTION

Designing a school is a particular kind of project in the world of architecture. It belongs to the large array of institutional buildings that society creates. Designing these buildings (e.g. hospitals, schools, etc) involves a series of procedures that do not occur when designing a private house. The interactions among people vary and the architect has to interact with a diverse group of people. Teachers and students are the one that use the classroom environment provided by the architect on a daily basis. While in most cases, architects are not always aware of the ways teachers and students use the space. This becomes critical when learning spaces have not been designed to allow the teacher to use a variety of teaching and learning methods, or the teacher adopts a particular method for which the space has not been designed (Smith 1974). However, as architects design schools and have their own approach to designing a learning environment, a well designed school with good architecture quality should reflect a healthy school environment that is comfortable, secure from danger, radiates a "sense of well-being" and send a caring message. This implies that an appropriate architectural design of a school and its environment is necessary and essential educational investment. Hence, the environmental quality of school buildings and its environs cannot be overlooked in the strategic educational planning process. And as rightly observed by Jeffery and Lackney (1997), the lack of adequate management of environmental quality concerns can have an even greater impact on the efforts of educators in creating and managing motivational learning environments. This paper therefore explores the linkage between the design of school infrastructure and healthy environment as it enhanced educational performance.

### ARCHITECTS' PROCEDURES IN DESIGNING A SCHOOL

The process of designing, constructing and maintaining a building has many common aspects across different settings. The initial motives for construction can be either need or profit. To realize a profit, for instance, developers must construct a building within some cost range. Then, there are decisions regarding zoning laws, codes, legal and political constraints, the economic criteria and so on. The design team must use current technology on construction and above aware of the social and cultural expectations in producing a new building (Heimstra, 1978). Creating a built environment is not a freewheeling process and architects may feel they have many constraints on their work.

### CLIENT IDENTIFICATION AND RESPONSIBILITIES

There is no one client in the designing of school building. Rather as one architect put it, it is a "multiple clients" scenario. There is the financial client, the person paying for the job and the user client, the school (that can also be the financial client). Once an architect is commissioned, the client and the designer together are responsible for stating clearly what the building is expected to do. This document is the brief of the project. The brief should reflect a broad array of concerns affecting design decisions. These are economical, cultural, structural, sociological etc.

## Architects' Approach to Enhancing Quality Educational Building Environment

### DEVELOPMENT OF THE PROJECT BRIEF

The brief qualifies design requirements such as the amount of floor space, types of spaces, materials and any other aspect relevant to the design. The generation of the brief is an important procedure because if it is wrong, the building will not work. It can take several formats. It is common for the architect to receive a standard brief developed by the Education Authority. Sometimes the brief may be developed in conjunction with the school, using schedules to document all the requirements. The spaces are carved out of a total area that is either given in the school, by building regulations or as a result of the cost.

### ESSENTIAL ENVIRONMENTAL CONSIDERATION FOR SCHOOLS

What should constitute the attributes of environmental quality that occupants perceive, if at all, as having an impact on educational outcomes in their school has been shown in a research by Berry (2002) to include:

- i. providing adequate space and opportunities for students and teachers to spread out, reflect, interact, exchange information, examine and test ideas.
- ii. inviting in appearance where students, teachers and the local community will want to be.
- iii. adequate natural lighting that enhances productivity.
- iv. striving for student and teacher friendly conditions throughout the building
- v. inviting and inspiring to good teachers and support their retention.
- vi. design that reduces stress both on the teachers and the students and be comfortable, having a consistent temperature, and manages noise.
- vii. cleanliness and sanitary
- viii. reduction in the risk of an adverse health.

In environmental consideration for the design of school, it is essential that students and teachers' comfort should be paramount as the most important aspect of any school environment. If students and teachers are comfortable, then learning and teaching becomes much easier. Being comfortable in a teaching and learning environment is therefore a combination of several different factors in design of school buildings; adequate usable space, noise control, lighting, temperature and climate control, sanitation and landscaping.

### ESSENTIAL DESIGN CRITERIA FOR A HEALTHY SCHOOL BUILDING

Generally, buildings do affect the people that occupy and use them. You can have pleasant rooms or nasty rooms, you can have useful ones and useless ones, you can have rooms with historical value, you can have futuristic ones, when you walk into these kinds of spaces, they have more effect in you than you can actually realize (Horne, 98). In school buildings, the classroom is the most important area of a school because it is where students and teachers spend most of their time and where the learning process takes place. The following criteria/condition helps in making the classroom a better place to learn.

#### SIZE, SHAPE AND SCALE

Creating education buildings that are conducive to learning depends on more than just providing sufficient space for students and staff. The size of the room affects the possible arrangement of activities within it. Generally, the larger the room the more flexibility will be required and the smaller, the more intimate (Lang, 1996). A rectangular shaped room affords more interactive visibility between occupants whereas "L" shaped ones or ones with alcoves allow for variety of privacy to individual learners. Movable wall devices can be employed to accommodate many different shapes. Classes should be designed to accommodate the required number of students to use the classroom without exceeding it. A lower density of students per classroom will increase teacher and student interaction and communication. According to Lang (1996) scientific observations indicate that student builds confidence through achievement, hence the ability to relate to elements within a room affords a degree of self empowering through scale that is relative. Size and locations of windows, doors, furniture and storage elements all should be considered or be adapted to the scale of the user(s).

#### ILLUMINATION AND VIEWS

Providing ample day lighting is critical in classrooms. Recent studies demonstrate that natural illumination aids learning significantly (Frenette et al., 2005). The design challenge is in maximizing day lighting so that the integrated use of artificial lighting can be controlled and reduced as much as possible. Producing high-quality, non-glare light will improve student performance and reduce energy consumption. Obviously, students cannot study unless lighting is adequate and there have been many studies reporting optimal

lighting levels (Mayron et al., 1994). Lighting in classrooms should focus on the front of the classroom and over the student's sit. Glare from hard surface is distracting and should be avoided wherever possible. Lab illumination on the other hand depends on the specific functions. Lab spaces with multiple computer screens may benefit by less natural illumination and potential glare. In other labs, creativity and innovation in design may permit natural lighting to contribute a positive psychological effect for students and staff who spend large amounts of time in such spaces. Lemasters' (1997) synthesis of fifty – three studies pertaining to school facilities, student achievement and student behaviour reports that daylight fosters higher student achievement. Hence effective lighting of schools has been related to high performance of students. The human need and desire for natural sunlight and for views to adjacent spaces (for orientation) requires that illumination sources be balanced for a variety of activities. And because daylight varies with the season, time of day, weather position of glaring, controls are necessary for its admission into the interior. Electric light sources are more easily controlled not only when balancing with sunlight but for the specific tasks that need illumination. Glare caused by the imbalance of light sources within one's field of view or bounced off of a reflective surface (marker board or computer monitor) is one of the major causes of irritation and is a detriment to learning. Knowledge of the extreme ratio of daylight to electric light (as great as 500:1) requires that control devices for reflecting, shading or blocking be carefully considered. Reflectivity of surface finishes, arrangement and location of light sources as well as their method for diffusion within the classroom all play an important role in the comfort for the student and teacher for the purpose of learning.

### **TEMPERATURE, HUMIDITY AND VENTILATION**

The temperature, humidity and ventilation of an enclosed space depends on a number factors such as the configuration and materials of the building, amount of glazing, size and volume of the space, number of occupants and their current state of activity as well as cooling and heating system (Lang, 1996). Hence the temperature and indoor climate is an important consideration in school design. Wyon (1991) showed that student performance at mental task is affected by changes in temperature. This implies that student will perform mental tasks best in rooms kept at moderate humidity and temperature level. Likewise, school must be designed with good ventilation as lack of adequate ventilation will result to inability of the occupant to function normally at any given task. One of the first symptoms of the poor ventilation in a building as pointed out by Akande and Olagunju (2005) is a build up of Carbon dioxide caused by human respiration.

### **MATERIAL FINISHES AND TEXTURES**

The selection of materials can contribute to the well being of the room's occupants. Finished selection backed up by an efficient building envelope design with proper air barriers can ensure that moisture does not reach materials and produce deterioration and mould (Frenette et al., 2003). Overall control of the construction process should ensure that material are properly fit together so that materials such as gypsum, for example are not exposed to moisture. Ideally, interior finishes should not be installed until the building envelope is complete and humidity control is in place. Hence, finishes within reach of should be cleanable, durable and/or replaceable. Apart from the finishes of materials, the perception of newness or cleanliness also affects learning.

### **MAINTENANCE PRACTICES AND SANITARY CONSIDERATION**

The design of schools is a very important factor when dealing with sanitation related to moisture. Building roofs that leak or will not stop water are detrimental to the comfort of the users. Water in classrooms leads to mold, which can cause allergic reactions. High humidity and standing water around also creates an environment favourable to all kinds of bacteria which can spread diseases. Cleaning and maintenance of schools is vitally important and is often underemphasized and underperformed. Students feel better going to clean classes and sitting in clean desks and surroundings. To maintain a quality learning environment, maintenance of existing structure must take priority and sanitary consideration must not be overlooked. However, consequences of deferring maintenance and sanitary consideration of the learning environment will include premature building deterioration accompanied by indoor air problems, increased repair and replacement costs etc. The frequent cutbacks in maintenance and renovation of school buildings coupled with widespread thoughtless, ineffective cleaning of school facilities and environment often sends a negative, uncaring message to students and educators. Invariably, these affect their performance levels which more often than not mirror the message they receive from a deteriorated school facility. On the other hand, enhanced management of school environments, through constant renovation, landscaping of the surroundings and cleanliness of both building with the surroundings sends a 'we care' message to students and staff. This will suggest that a healthy environmental conditions will shape attitudes and eventually, positive performance.

## CONCLUSION

Schools are not primarily environmental showcases. Schools are special environments that exist for the purpose of enhancing learning process. They are sensitively built environment housing very special segments of the population, hence, appropriate architectural design with great consideration for indoor and outdoor environment to facilitate comfortable learning and maximum performance is essential. Therefore, there is need for effective restoration, renovation and maintenance to provide a quality-learning environment. This can be achieved by employing the services of professional architects and landscape designers to provide appropriate architectural and landscaping designs that addresses total environmental quality that include general sanitation, good air quality, noise control, lighting and glare reduction, soothing colour and general comfort provided by temperature and climate. This will provide a quality school environment that is transformed from a state of hopeless deterioration to a healthy condition, which will affect the attitude of the students, teachers and surrounding community and turn them energetically positive in their attitude to productive teaching and learning.

## RECOMMENDATIONS

In the reality of school construction, the potential contribution of architecture to improve educational achievements can further be enhanced through the following recommendations:

- (i) School buildings should be climatically appropriate in orientation in order to capture the maximum flow of natural air into the buildings for adequate ventilation.
- (ii) Design details relating to shading devices, ventilation and rainwater protection should be included in the architectural design of school buildings.
- (iii) There should be proper choice of appropriate building materials and building technology included in the design specification for schools and ensuring their application during construction.
- (iv) The design should be such that it will create a "fully functional" building environment.
- (v) Environmental consideration should be embedded in architectural design, teacher's education and in school management training, so that these important element are not relegated to the 'background noise' of educational discourse.
- (vi) The design process must focus on environmental change in schools, so that teachers and learners might experience motivational and perspective – changing benefits.
- (vii) Environmental improvement in school's design and building should be a major concern of the educational administrators through constant maintenance of school building and its environs by adequately funding renovation of deteriorated structures.
- (viii) The design and maintenance of school buildings should be taken into account as factors that contribute to a positive learning environment for students and working environment for the teachers (Christopher, 1988).

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