Appraisers of Obstacles and Strategies for Upgrading Ergonomic Status of Learning Chair and Desk in Schools in Oyo State, Nigeria

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Abstract

There is growing concern in many nations to improve learning and classroom performance via upgrade of ergonomic status of learning chair and desk used by students. African countries, particularly Nigeria, appear to be having obstacles to key into the new trend. This study investigated the feasibility and obstacles of upgrading ergonomic status of the items in schools in Oyo State, Nigeria. Methods used include review of available research reports and interaction with educational stakeholders viz school administrators/owners, parents/guardians, students, researchers and items manufacturers. Interactions were guided by structured questionnaire and about 30 respondents of each category of the stakeholders were involved in the study except the researchers while relevant statistical tool were used to obtain result. Findings affirmed that learning chairs and desks offered to learners by private and public owners at both Primary and Secondary Schools in Oyo State are ergonomically unfit. Students in the study area suffered same poor performance in science subjects traceable to the use of ergonomically unfit learning chairs and desks. Though about 68% of total respondents care less about the need to ergonomically upgrade learning chair and desk due to the perceived cost that may involve in changing the existing ones, impact on cost of education, logistics, and personal reasons; school administrators and researchers were favorably disposed. Despite showing support for the item upgrade by agents of government, there is lack of political will. Other obstacles include poor attitude/enlightenment on the part of other school owners, dearth of research suggestively caused by high cost, lack of sponsors and appropriate research facilities coupled with technological gap. The study observed high possibility of upgrading ergonomic status of learning chair and desk in the study area especially by surmounting identified obstacles through enlightenment, monetary aids to researchers as well as political will.

Keywords: Learning chair and desk, Ergonomic Status, Upgrading obstacles, Oyo State

1. Introduction

According to Webster's Medical Dictionary (2010), ergonomics is an applied science concerned with the characteristics of people that need to be considered in designing things that they use in order that people and things will interact most effectively and safely. When applied to classroom situation, ergonomic classroom chairs and desks would refer to a classroom chair and desk that enables students to sit in a manner that eliminates or at least relieves the musculoskeletal stress and therefore helps them to learn more effectively.

School furniture presents a particularly burdensome problem in terms of incessant replacement and satisfaction of ergonomic adequacy to the users. Africa is yet to have a defined management process, generic designs, generic specifications or centralized guidelines on the standard of furniture items that should be offered to the students for learning. However, relationship exists between the dimensions of classroom chair and desk and user's body dimensions (Farahani and Shakib, 2009; Tunay and Melemez, 2008; Gouvali and Boudolos, 2006; Molenbroek et al., 2003; Parcells *et al*., 1999). No study has contradicted the fact that even minor ergonomic changes in the design of learning chair and desk can make significant improvements in learner's comfort, health, safety and performance. Indeed all the studies reviewed by this author spanning five decades reflected a statistically significant relationship between the condition of the classroom and student achievement.

This suggests of the fact that there is growing evidence of a correlation between the ergonomic adequacy of classroom learning furniture and student behavior and performance. The European countries and, perhaps more precisely the Scandinavian countries, have shown more interest in the studies and practices promoting evolvement of classroom chair and desk designs that are suitable to the needs of the students and with appropriate dimensions according to the students' anthropometry characteristics.

Studies have shown a clear mismatch between anthropometry characteristics and the dimensions of classroom furniture in many nations of the world (Osquei-Zadeh, *et al*., 2012; Ghazilla and Taha, 2010; Ariadurai *et al*., 2009; Kagawa *et al*., 2007; Khaspouri and Sau. 2007; Aziz *et al*, 2006.). However, there is dearth of such study on many African countries until recently (Abdel Rahman and Shaheen, 2008; Adewole, 2010). In two decades, poor performance of school children in science-based subjects has stimulated some studies to review the causes of the menace. As a fall out of this, and specifically in the last decade as evident in the reports available for review, there appears to be growing interest in evaluating the ergonomic status of learning furniture in schools in Nigeria (Ashiedu and Amiebenomo, 2013; Adewole and Isedowo, 2012; Musa, 2011; Ismalia and Akanbi, 2010; Adewole, 2010). These few studies also reported same situation of mismatch between school children and the furniture offered to students for learning in Nigeria. Earlier researchers have proved that

mismatch of dimensions of learning furniture and users do affect the learning process, even though the most motivating and interesting lessons (Hira, 1980). Also, Parcells *et al*. (1999); Grimmer and Williams (2004) the potency of the mismatch to create some musculoskeletal disorders, such as low back pain and neck-shoulder pain for the unfit furniture user.

The commitment of the European countries to the issue of upgrading furniture ergonomic status, particularly the learning classroom chairs and desks, has led to the publication of the European standard EN 1729 (CEN - European Committee for Standardization, 2006), a standard which determines the dimensions and characteristics of different types of school furniture for the whole European population. Despite the recommendations by few studies conducted on the status of classroom chairs and desks in Nigeria, there appear to be no commitment to upgrade the existing unfit learning furniture items in Nigerian schools. It is apparent that bottlenecks exist in keeping with the trend of upgrading ergonomic status of learning chairs and desks in Nigeria. In view of the strategic position of Oyo State in educational role in Nigeria, this study was initiated to critically review the state of learning chair and desk in the state with a view of identifying possible obstacles to its ergonomic upgrading. The object was to evolve strategies that will encourage upgrade of learning chair and desk to fit ergonomic requirement of the users in the study location.

(Olaniran, 1998) Fourchard, 2003and Oketoki, D (1998); National Bureau of Statistics 2010, Oyo State Government Diary (2007). Federal Republic of Nigeria. (2004). Oyo State Ministry of Education Gazette, 2003; Emmanuel Alayande 2013.

2. Methodology

Oyo State is strategic to this study because of its being the natural headquarter of the South-Western people in Nigeria (Oketoki, 1998; Fourchard, 2003; Federal Republic of Nigeria, 2004; Oyo State Government Diary, 2007; Alayande, 2013). Oyo State is an inland State in South-Western Nigeria with Ibadan as the capital. It has a population of about 7million people and population density of 200/km^2 as at 2007 (Oyo State Government Diary, 2007; Oyo State Ministry of Education Gazette, 2003; Wikipedia, 2014). The State has 1,703 public schools, 971 private nursery/primary schools, 335 public secondary schools including 7 schools of Science and 57 private secondary schools. It also has 5 technical colleges, 3 polytechnics, 4 Universities and the first teaching hospital in Nigeria (Olaniran, 1998; Fourchard, 2003; Oketoki, 1998; Oyo State Government Diary, 2007; Federal Republic of Nigeria, 2004; Oyo State Ministry of Education Gazette, 2003; Wikipedia, 2014).

Oyo State could also boast of a Federal School of Survey, Cocoa Research Institute of Nigeria (CRIN), Agricultural Institute for Research and Training (AIR&T), Nigerian Institute of Science Laboratory Technology (NISLT), Federal School of Forestry

(FRIN), Nigeria Institute for Social and Economic Research (NISER), 15 Nomadic schools, 213 continuing education centers, 15 special primary schools, 8 special secondary schools catering for handicapped children, Agency for Adult and Non-formal Education (AANFE) which caters for adults who had no opportunity of formal education with 455 classes in existence in the 33 Local Government areas of the State where it trains about 200,000 illiterate adults yearly (Fourchard, 2003; Oyo State Government Diary, 2007; National Bureau of Statistics, 2010).

Data was collected from Ibadan, Oyo, Ogbomoso, Iseyin, Saki, Eruwa and Igboora. Thus, the study was conducted in the State capital, and two major cities selected randomly from the three major zones comprising Oyo State. A total of 225 educational stakeholders comprising 85 school administrators/ government agent/owners, 35 parents/guardians, 75 students, 10 researchers and 30 wooden furniture manufacturers were interviewed using structured questionnaire. Data were analyzed using both descriptive and analytical statistics. The study has also reviewed findings of available ergonomic studies to validate information collected on the field.

3. Result and discussion

The finding of this study was discussed under four segments, each segment addressing the main topical issue under review.

Status of the Classroom chairs, desks, and Perception of the Stakeholders in Oyo State

The information obtained from 78% of the total students involved in the study, response credited to about 49% of the school administrators and all the reviewed studies (Ashiedu and Amiebenomo, 2013; Adewole and Isedowo, 2012; Musa, 2011; Ismalia and Akanbi, 2010; Adewole, 2010) affirmed that learning chairs and desks offered to learners at both private and public schools in both Primary and Secondary School levels in Oyo State are ergonomically unfit. On account of response of the students, they suffered the same experience attributable to the use of ergonomically unfit learning chairs and desks. However, the poor performance of student in concentration test, largely accounted for by use of unfit learning chair and desk (Parcells *et al*., 1999), was contested by all government agents and 62% of the parents/guardians of the respondents. This position reflects the level of ignorance by the group on already established correlation between the use of unfit chair and desk and concentration test (Ashiedu and Amiebenomo, 2013). In Figure 1, the overriding opinions expressed by all respondents are graphically classified. Approximately, 68% of the total respondents do not considered imperative ergonomic upgrade of learning chair and desk. The cost and frequent replacement of the items which the ergonomic upgrade may unavoidably require informed the position of the group.

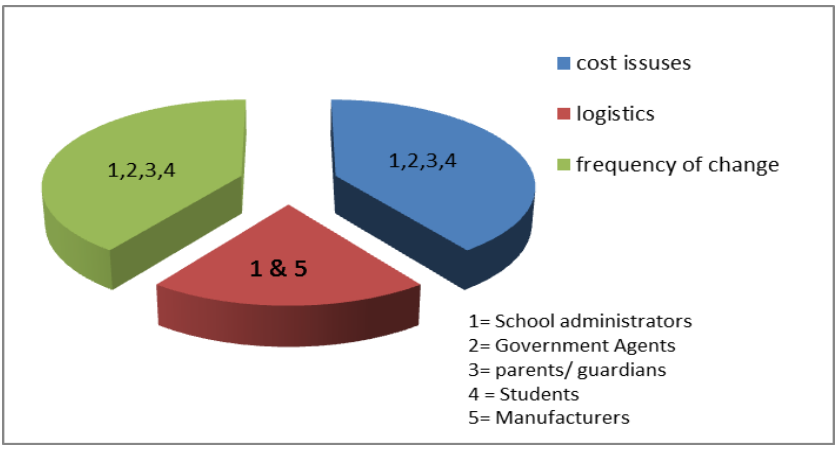

Figure 1: Reasons Adduced for Non-willingness to Ergonomically Upgrade Furniture

Indeed, the parents, school administrators, government agents and students' opinions converged on the fact that because students at both primary and secondary school levels were within the age of rapid growth, and, would therefore, be a waste of time and resources to tie furniture to their dimension. These respondents are of opinion that more other needs required to support learning are more germane than '*wasting*' money on upgrade of ergonomic status of learning chairs and desks. It is however worthy of note that all researchers and 20% of the parents/guardians (they all possessed post-secondary school certificates) supported the idea of the need to upgrade the existing learning furniture to a status that fit furniture dimension with anthropometry data of the users.

Benefit of Upgrading the Ergonomic Status of Classroom Chairs and Desks

Educational stakeholders should be made to appreciate the principle behind the application of ergonomic principle when designing chairs and desks to be used for learning for a particular population of students. Ergonomic upgrade of any facility is a process the ensure the consideration of people characteristics in the design of such facility so as to guarantee effective interaction between the facility and the user on one hand, and, the safety or wellbeing of same user on the hand. When applied to classroom situation, ergonomic classroom chairs and desks would refer to a classroom chair and desk that enables students to sit in a manner that eliminates or at least relieves the musculoskeletal stress and therefore helps them to learn more effectively. It is important that school management recognizes the uniqueness of the body form of student. Many at times students of the same age or height have different needs of learning furniture in that some will have longer legs, some shorter, the back structure may differ, among other variables. In Oyo State and perhaps Nigeria generally, pupils in primary and secondary schools are made to sit in classroom using their learning chair for about 80 percent of the time

spent daily in school. This fact is corroborated by the subject time-table in use at these two levels of Education in Oyo State in particular and Nigeria in general (Figure 2) . Much of this time in our local, schools are spent reading and writing.

Research findings have shown that students of age 18 and younger are more susceptible to chronic musculoskeletal disorders than adults, since their bodies are still in the developmental stage (Parcel *et al*, 1999, Pheasant, 2003). If this observation is valid, then, it is more than imperative to provide all our students with ergonomic classroom chairs and desks to avoid development of bad posture and to prevent health hazard. Another thought that may although be viewed as less compelling than health issue, but which is still a real concern to this study, is the student performance in concentration test. It is often difficult to hold students' concentration for necessary period while using unfit learning chair cum desk. Student often needs to frequently adjust to mitigate accumulated pressure on different body parts caused by the use of unfit chair and desk. This makes student to lose concentration readily and it often take longer time to restore the loosed concentration. Pedagogical study has attested to the fact that student learning science subjects like mathematics, physics and chemistry requires prolong concentration when learning Indeed poor performance in these subjects may be partly linked to inability of student to hold concentration when learning (Bloom, 1976; Good and Brophy, 1997; Lehrer and Chazan, 1998.; Jebet, and Naserian, 2003; Tuncay and Omur, 2009; Oluwatimilehin and Owoyele, 2012; UNESCO, 2014; Dursu and Dede, 2004). One may not, therefore, be absolutely wrong to assert that the use of unfit learning furniture by the students in Oyo State plays considerable role in their current poor performance in the categories of subjects that require prolong concentration during learning.

In Nigerian situation where technological capacity and high cost has made adjustable chairs and desks alien to our school tradition, school owners or administrator can supply classroom chairs and desks of varying heights for each grade (Adewole, 2010). Studies have shown that a large percentage of students are sitting in chairs that are either too high or too low for their height. This leads to feet dangling in the air, which increases back pressure, or, on the other hand, leads to a crunching of the knee area, which enforces bad posture as well as a constricting of the leg muscles (Parcel *et al*, 1999, Pheasant, 2003). If schools have classroom chairs available in a number of different heights, then a major problem of student-chair mismatch will be solved. Once the height issue is resolved, schools can provide seat and/or back cushions.

Ideally, any of the teachers with minimum training on ergonomics can assist each student in selection and necessary adjustment of cushion to allow his or her classroom chair to provide the maximum leg and back support possible. This would go a long way toward alleviating musculoskeletal pressure points. If the idea canvassed in this section of the study is utilized by school

administrators, there is no doubt that their students will not only be sitting better, they will also be concentrating and perform better in their classroom work.

Identified Obstacles to Ergonomic Upgrade of Learning Chair and Desk

The first obstacle identified by this study is lack of awareness on the benefit of using ergonomics chairs and desks in the classroom for learning. Indeed, many see it rather as a luxury or in the best a frivolity. This is because they are not well informed on the benefit of applying ergonomic in classroom facility design. Not much information is available to the general public who should spear head the change of order.

Another obstacle is the State Government attitude toward evolving, and readiness to implement, educational policy that is student oriented. As at the time of this study, there is no policy on education in the State that specify minimum standard of facility, especially learning chairs and desk that operators of schools should comply to. The government herself lacks political will to ensure that appropriate machinery of government and fund is deployed to schools in a way that will enable the public schools to work in the best interest of the students entrusted to them. By this, we mean providing safe and protective schools that are adequately staffed with trained teachers, equipped with adequate resources and graced with appropriate conditions for learning (including provision of ergonomic learning furniture).

The third challenge is that there is no data available for the designer and manufacturers of these furniture items to work with. This is because of the dearth of study on anthropometry of the varying students' populations in the State. This appears to be a general trend in Nigeria in view of the fact that most of the existing scanty studies are not statewide in scope. Most either focus on too small populations like focusing study only on one or two schools. Again, most of the research findings in ergonomics are never implemented and sometimes not published for wider consumption. Poor communication also characterized the finding of many studies. However, the cost, research facilities and time involved were the great bane to scaling the hurdle.

The fourth challenge is the production problems. The local manufacturers are largely illiterate and rooted in the practice of coping rather than developing model. They are deeply entrenched in a conservative belief of sustaining business through the practice of 'one size fits all'. Adoption of application of engineering principle in furniture manufacturing remains a major challenge to them. Another face of this problem is the lack of technological know-how and capacity for mass production especially by the local manufacturers. The cost of adequate raw material remains another threat because of the interest of these manufacturers to maximize profit.

Cost issues appear to be central to upgrading the ergonomic status of classroom chair and desk in Oyo State. Many schools would not be able to raise the money to implement as they are barely coping on the issue of finance and income. Resistance to change is a social problem that is further strengthened by cost issues.

Possible Strategies to Remove Identified Obstacles

There is need for massive enlightenment perhaps through workshop that may be strategically held in a state like Oyo in Nigeria. Such workshop should involve relevant agents of government and relevant stakeholders. Experts in the field of ergonomics would be needed to carry such crusade to other parts of Nigeria. And Oyo state will be appropriate as the pilot state to drum support for ergonomic application in school facilities.

The International body driving this concept of ergonomic application in schools and other work place may have to assist African countries, particularly Nigeria, to establish a national center where the crusade to influence educational policy in same direction can be achieved. The Federal and State Governments should be made to know that the object of the Millennium Development Goals (MDG) is not only to encourage student enrolment but to ensure that quality education is guaranteed through appropriate legislation, including setting up appropriate standard like specific legislation on standards for the definition of the appropriate furniture characteristics to be used by school children by every school operators, including the government.

Policy makers should be concerned about the relationship between school facilities and student learning and achievement, not only because of health, security, and psychological issues, but also because the failure to create and maintain optimum learning environments can undermine other efforts to reform education. This means that government should outlaw the use of school furniture that has been acquired without input from any ergonomic criteria that most likely will result in some changes and problems in their musculoskeletal system, as well as in a possible decrease in their education performance.

Funds may have to be deliberately set aside that can be accessed by researchers to develop anthropometry data that can be used by manufacturers of learning furniture items. Training and retraining of relevant personnel involved in the production of the item may be facilitated by relevant donor agencies concern with child education and health.

The training should not only target the producers of school furniture but more of the burden rests on researchers that can expand the frontier of research on ergonomic studies. Available reports should be duly published and made available to the users. Finally, more donor bodies may have to come to the aid of African countries, particularly Nigeria. It is necessary to keep pace with the international trend in ergonomic application in facilities offered for learning in our schools.

4. Conclusion

This study observed that both primary and secondary schools in Oyo State still offer learning chairs whose dimensions do not fit the anthropometry characteristics of the students. Despite the growing concern in many nations to do away with this type of learning furniture in their classrooms, it appears there is no such deliberate effort in practice in Oyo State. Costs that may be involved, school owners and government attitude as well as technological capacity required to implement the drive were the major obstacles. However, a foreign aid, in terms of monetary grant and presence to mobilize for appropriate policy, by relevant bodies designated to drive and to popularize the idea of ergonomic application in school will be the right strategy to remove the identified obstacles.

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