

## **SUPPORTING LEARNING THROUGH HEALTH AND SAFETY PRACTICES IN THE 21<sup>ST</sup> CENTURY CLASSROOM: THE ERGONOMICS OPTION (TEO)**

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### **ABSTRACT**

The descriptive survey elicited responses from one hundred and ninety (190) final year computer science students who had taken courses that were predominantly computer based. A twenty two (22) item questionnaire; furniture, computer, environment, working/organizational activities (FCEWO) was the instrument used to conduct the study, having met both criteria of validity and reliability. The criterion of validity was achieved via peer review while a test-retest reliability co-efficient of 0.78 confirmed the reliability measure of the instrument. A major finding amongst others, was that the design of classroom furniture do not promote health and safety practices, hence they failed to meet ergonomic standards. On this note, a major recommendation was that management of institutions should ensure that design of classroom furniture should be of varied forms that will support the health and safety of learners in no small way.

**Keywords:** Occupational health, musculoskeletal injury, eye strain and productivity.

### **BACKGROUND OF STUDY**

It is no gainsaying the obvious fact that the present day classroom has witnessed an influx of Information and Communication Technologies (ICTs), the computer in particular. This trend in no small measure has also increased the rate at which learners interact with ICTs as they (learners) largely depend on them (ICTs) for knowledge generation and acquisition. So, learners of the present age are continuously interacting with these devices on a daily basis, exposing themselves to the health and safety issues related to ICTs usage. Hence an ergonomic consideration of the interacting platforms/classrooms and associated ICTs devices and how they can optimally utilize these technologies without endangering their health becomes an issue of utmost concern.

Ergonomic issues which were industries focused have crept into the classroom in the quest to achieving occupational health, safety and productivity. Ergonomics is the fitting of task to a learner, and a science that deals with designing work station/classroom to reduce injuries and disorders associated with poor design. No wonder it is synonymous with comfort or functional design, a practice that takes into cognizance the interaction between computer and learners. So, in short, it concerned with the “fit” between learner, equipment and the classroom environment. Ergonomics is a discipline that extends across all aspects of human activity. It is also known as human factors/human engineering, and is the design or modification of the workplace to match human characteristics and capabilities (Adeyemi, 2010). Ergonomics was developed as a consequence of problems presented by new work systems. It was developed through the same processes that led to disciplines like industrial engineering and occupational medicine (Bridger, 1995). The reasoning is that whatever

issues that will impair or hinder learning deserve to be given its needed attention and place. As they concern this paper, they include; classroom furniture, ICTs/computers, arrangement of ICTs/computers and the actual usage/organization of the classroom activities as not to endanger the health and safety of learner. Classroom furniture (desk, chairs, space and layout) constitute what in ergonomic parlance is referred to as workstation design. Classroom furniture from the ergonomic perspective should be designed to support learners' need, should be adjustable to take care of students' varying heights as not to obstruct visibility, must not pose any form of physical stress or strain on learners. After all, sitting involves large and small motions (Springer, 2010). The ergonomist maintains that maintaining balance and slight position changes involve micro motion, while larger macro motions involve moving our arms and legs. Both motions, the author maintains are essential for our well being. Ergonomics also has it that classrooms should be adorn with various seating types and that they should be able to make flexible layout a possibility; make re-arrangement of seats a no difficult task, especially when collaborative or individualistic learning is the case.

In the use of ICTs/computers as not to endanger the health condition of users and safety guaranteed, ergonomics is interested in the viewing distance, time at computer, seat and height posture. Also, it aligns itself with the issue of footrest, mouse and keyboard, computer suites, cable management, protective covers and their arrangement generally. This position is in agreement with the understanding that ergonomics relates features about behavior, attitudes and boundaries and other design of computer tools, machines accessories for creative, safe, comfortable and actual *learner's* use (Sanders & McCormick, 1992)

On classroom environment, ergonomic issues include proper ventilation, noise-free environment, moderate humidity, proper lighting and steady energy supply, amongst others. On the part of users and organizational activities, ergonomic issues cover; appropriate sitting position, elbow/keyboard position, presence of wrist rest, rest/break at reasonable intervals and choice of sitting position. That is, ergonomics is concerned with the comfort of users/learners while interacting with the tools/devices they are using as to reduce unnecessary health related issues and guarantee safety, while of learning with ease. Both work environment and work organization are considered as core ergonomic issues (Elshaiekh, 2014) and (Tome, Adenso-Diaz & Gonzalez 2002).

### **Statement of problem**

Learners of the digital age, both 'natives and immigrants' are constantly exposed to ICTs/computers in their classrooms/laboratories and workstations. This daily contact, exposes them to such risks as; repetitive stress injuries (RSIs), which has to do with painful nerve and tissue damages to the wrist and back especially caused by long hours of poorly designed computer classrooms/laboratories or workstation; electro-magnetic emissions from computer monitors; computer vision syndrome (CVS), musculoskeletal injuries, amongst others. Hence the major thrust of this survey is to ascertain the conformity of these working stations to such ergonomic issues that reduce threat to health and guarantee safety of constant users of such rooms.

### **Research Questions (RQs)**

1. Does the design of classroom furniture support health and safety practices?

2. Does the arrangement of ICTs/computers in the classroom promote health and safety practices?
3. Does the classroom environment promote health and safety practices?
4. Do environment/organizational activities promote health and safety practices?

### Significance of study

- Management of institutions will find this study of immeasurable value in the sense that it will guide them in the design of computer classrooms/laboratories and workstations.
- Users/learners will be provided with the needed clue on health and safety issues related to constant exposure to ICTs/computers and the best and appropriate ways to function while handling and interacting with them.

### METHODOLOGY

**Research design:** The study is a descriptive survey that sought to confirm the level of ergonomic consideration of present day classrooms.

### Population

This consist of final year computer science students of university of Port Harcourt (Uniport) and University of Science and Technology (UST) who have offered various courses that are ICT based.

### Sample size

A sample size of one hundred and ninety computer science students at last was used for the study. What that meant was that thirty members of the targeted group did not respond to the questionnaire. The distribution of the sample size is as shown below.

**Table1: The sample frame**

Questionnaire	Uniport	UST	Total
Administration	120	120	240
Retrieval	100 (83.3%)	90 (75%)	190 (79.2%)

### Instrumentation

A 22-item questionnaire captioned; furniture, computer, environment, working/organization (FCEWO) designed and developed by the researchers was used. FCEWO, is an instrument in four segments (A, B, C & D), containing (6,6,5,&5) items respectively. It had only two options (Yes & No), which left respondents with one option only to each of the items. So, by interpretation, heavily yes items represented application while no items represented non application.

### Validation of Instrument

This criterion was achieved by the researchers who developed and sought out irrelevant items vis-à-vis the RQs. Also, the instrument was subjected to further scrutiny via peers' assessment.

**Reliability of instrument**

A test-retest reliability co-efficient of 0.78, close to unity was a clear pointer that the instrument was reliable.

**Data analysis and result**

**RQs 1.** Does the design of classroom furniture (CF) support health and safety practices?

**Table 2.** Ergonomic features of CF

Description	Respondents' view		Remark
	Yes (%)	No (%)	
1. CF are designed to meet learners' need	30 (15.8)	160 (84.2)	Does not apply
2. CF are adjustable	40 (21.05)	150 (78.95)	Does not apply
3. CF inhibit physical stress and strain	50 (26.32)	140 (73.68)	Does not apply
4. CF are properly scaled	20 (10.5)	170 (89.5)	Does not apply
5. CF have different seating types	30 (15.8)	160 (84.2)	Does not apply
6. CF support flexible layout	50(26.32)	140 (73.68)	Does not apply

**RQ2.** Does the arrangement of computer (AC) promote (AC) health and safety practices?

**Table 3.** Ergonomic features of usage/computers

Description	Respondents' view		Remarks
	Yes (%)	No (%)	
1. Computer are housed in suites	60 (31.6)	130 (68.4)	Does not apply
2. Cable management is adequate	140 (73.68)	50 (26.32)	Applies
3. Top of monitors matches eye level	130 (68.4)	60 (31.6)	Applies
4. Monitor distance relaxes the eye	120 (63.2)	70 (36.8)	Applies
5. Monitor wear protective cover	110 (57.9)	80 (42.1)	Applies
6. The arrangement supports learning	100 (52.6)	90 (47.4)	Applies

**R/Q3.** Does the classroom arrangement promote health and safety practices?

**Table 4.** Ergonomic features of environment

Description	Respondents' view		Remarks
	Yes (%)	No (%)	
1. Classroom is well ventilated	120 (31.6)	60 (68.4)	Applies
2. Learning is not affected by noise	90 (47.4)	100 (52.6)	Does not Apply
3. Humidity is learner friendly	70 (36.8)	120 (63.2)	Does not Apply
4. Lighting and visibility are adequate	90 (47.4)	100 (52.6)	Does not Apply
5. Energy supply support learning	45 (23.7)	145 (76.3)	Does not Apply

**R/Q4.** Do the use and organizational activities promote health and safety practices?

**Table 5.** Ergonomic features of working activities

Description	Respondents' view		Remarks
	Yes (%)	No (%)	
1. You were taught sitting position	20 (10.5)	170 (89.5)	Does not Apply
2. You have idea of elbow/keyboard position	30 (15.8)	160 (84.2)	Does not Apply
3. Your systems have wrist rest	30 (15.8)	160 (84.2)	Does not Apply
4. Rest/break times is adequate	60 (31.6)	130 (68.4)	Does not Apply
5. Choice of sitting position is enhanced	40 (21.05)	150 (78.95)	Does not apply

## DISCUSSION/CONCLUSION

The first finding of the study was that classroom furniture does not conform to ergonomic recommendations, that means, classroom furniture do not promote adjustment to match a user's height as they are not properly scaled. Also, making classroom to have a flexible layout is a reality. The consequence is that they do not meet learners' need nor do they support the curriculum (table 2.) This finding agrees with Elshaiekh (2014) but in conflict with the positions of Singer (2010) on the strength of office seating as well, and Day (2013) on what makes classroom furniture ergonomics, thus do not support health and safety practices. Secondly, the study found out that arrangement of computers to a great extent promotes health and safety practices. This position is collaborated by the data as contained in table 3. The indicators here meant that CVS and other related eyestrain conditions are not common, simply because arrangement of computers meet ergonomics considerations. This is in tandem with the position of Sanders and McCormick (1992) and the findings of Adeyemi (2010), and Tome, Adenso-Diaz and Ganzalez (2002). The third finding is that classroom environment does not promote health and safety practices. This is corroborated by the outcome as shown on table 4, as four (4) items in this direction weigh against one (1) on the other side. There is the need to acknowledge that light is an element in the ergonomics of learning (Martel, 2016), Adeyemi (2010) and Elshaiekh (2014). Finally, the study showed that the use and working activities in the classroom do not support health and safety practices. The display on table 5 points at this direction. This finding agrees with Hedge, Morimot & McCrobie (1999) and fails to align with the point of Aina (2004); Bade (2008) and Madu and Adenirin (2000) on their paper that targets proper utilization, uses and preservation of resources, as they apply in the libraries and information centres. In Conclusion, a classroom/laboratory is a working place where learning should be facilitated without exposing learners to unsafe and unhealthy conditions. To ensure that occupational health, safety and productivity are achieved, this paper posits that classroom furniture, computers to be used in the class, classroom environment and use/organizational activities should toe the path of ergonomic position. In this wise, the health and safety of our learners while interacting with computers would be guaranteed.

## RECOMMENDATIONS

1. Management of institutions of learning should ensure that alternative designs of furniture are provided in the classrooms. In this manner, desired layout that would support a curriculum can be feasible.
2. Adequate attention would be given to the classroom environment to ensure that the right humidity, lighting and power supply are provided. It is only on this note that learners can function effectively while interacting with the systems.
3. Basic orientation on sitting position to reduce health risk and promote safety is cardinal. A situation where learners just walk into computer classrooms and start fiddling with tools is not too ideal.

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