

## III-Equipped Environment: Pedagogical Implications for Computing and Information Technology

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### ABSTRACT

In the globalised world, technology has become the in-thing as countries and/or organisations devise means of gaining a competitive edge over others. In view of this, education systems in individual countries need to be tailor-made to suit this endeavor. Computing education, on the other hand, is very important to the development of a nation. It helps in the understanding of information technology. Despite the importance of this subject, the delivery of computing education and training was variable in quality. Too much teaching and learning was mediocre and has raised fears that technological development may be a pipe dream for the nation. This paper focuses generally on students of computer science and specifically highlights the problems associated with teaching and learning of Computing, implications of ill-equipped environment as it relates to Computing and Information technology, and recommendations on possible ways of creating an enabling environment to achieve efficient and effective teaching and learning of computing education at various levels of our educational system, to make the ongoing quest a success.

**Keywords:** Information Technology; School Environment, ill-Equipped Environment and Students' Learning

### Aims Research Journal Reference Format:

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### 1. INTRODUCTION

Generally in the whole world, particularly in Nigeria, Education has been accepted as a veritable instrument for national transformation, development and improved productivity. It is an empowerment tool for both individual and national growth. In the medieval period, the French, the Spartans and the Greek utilized education to survive as a nation and produce the ideal citizens, by formulating and implementing policies targeted at the attainment of desired societal goals. Successive government in Nigeria, through relevant ministries and agencies have accorded due recognition to the importance of computer technology in the teaching and learning processes. It is on this premise that the government of Nigeria sought to introduce computing education into the Nigerian school curriculum from primary through to tertiary institutions.

Computing education plays a significant role in today's era. It helps in the understanding of information technology. It is being gradually applied in all aspects of human endeavour. Computing education is being advocated because it is certain that computer literacy will have as much impact on career opportunities in this fast growing information age (Adamu and Bello, 2002). Many have had high expectations for the impact of computing education on societal development. By and large, these expectations have not been realized. It has become evident that several factors such as learning environment has tremendous influence in the quality of teaching students receives and the extent of attention they pay to lesson in school. The paper focuses generally on Students of Computing and specifically highlights the problems associated with teaching and learning of Computing Education, and Pedagogical implications of ill-equipped environment as it relates to Computing and Information Technology.

#### 1.1 Concept of Computing Education

The definition of the concept of computing education has evolved over time. This is evident in the different definitions offered by various authors and researchers in trying to make clear the meaning of computing education. Computing education which includes computer science and information technology has become one of the most fast growing and far reaching developments in Nigeria (Okebukola and Ajewole, 1990). The transmission of information and instruction are now bending towards Computer technology.

Okebukola cited in Ehondor and Omoruyi (2013), the idea of using and studying computer in schools and its gradual acceptance started in the late 1960 even though computers have been around much earlier. Computer is conceived as a device or machine designed specially to perform calculations, process data and store information which can be easily retrieved when required (Adamu and Bello, 2002). To Ahore (1990), computer refers to a device for executing precisely stated rules with accuracy, rapidity and with great reliability.

Computing education, on the other hand, Adamu and Bello (2002) described as a learning process in which the individual is taken through the rudiments of using the computer to store and process data accurately and efficiently. The process seeks to equip the individual with skills and knowledge that can make him/her use the computer effectively. According to Ogwo et al., (2015), Computing education refers to as the amount of knowledge and skills acquired by an individual to perform a given task using a computer system. Expectedly, the knowledge and skills acquired in this area may be very high, high, low or very low, depending on the individual's exposure to computer facilities. Computing education is of paramount importance to national development and it is on this premise that the government of Nigeria sought to introduce computer studies in the educational system from primary through to tertiary institutions.

This form of education has its own function as stated by the National Policy on Education (1998) in Nigeria as follows:

- a. Produce manpower that can be trained on both software and hardware development.
- b. Produce computer engineers that can repair and service faulty components.
- c. Produce experts that can make use of computer in the field of pure and applied science, engineering and research work.
- d. Develop scientific attitude and scientific way of planning, observing and working through experiences in problem solving.
- e. Acquisition of literacy, numerical like skills and values for lifelong education and useful living.
- f. Develop an appreciation of the contribution of computer to man and society and its importance to the future.

These expectations cannot be realized if an enabling teaching and learning environment is not created.

### 1.2 Concept of School Environment

According to Akande in Ode, et al., (2015), learning can occur through one's interaction with one's environment. Environment here refers to facilities that are available to facilitate students learning outcome. It includes books, audio-visual, software and hardware of educational technology; libraries; so also, size of classroom, sitting position and arrangement, availability of computer labs for practicals (Farombi, 2000). Learning to a great extent is influenced by the environment students and teachers are exposed to and the facilities that are available in such environment can lead to experience, and this plays an important role in ensuring effective teaching and learning of computing education.

School environments can serve as an active contributor to the students' learning process (Keep, 2002). The researchers further stated that learning opportunities can be integrated into the structure of the school, thereby making it an active space rather than passive spaces, housing a disarray of things. For individuals to be self-motivating and self-imitating, the environment or the setting must be amenable and responsive to human interaction. If the settings do not allow for permeability and malleability, then individual initiative in the learning process is stifled (Quisenberry, et al., 1991). As Piaget cited in Okeke (2001), opined that active interaction with the environment is regarded as the most basic requirement for proper intellectual development.

A healthy and attractive school environment makes for conducive learning and promotes students pride in their schools and their interest to stay in school (Mgbodile, 2004). Belanger cited in Eze (2010) writing on the importance of learning environment stated that people's educational life histories are influenced not only by provision of learning opportunities, but also by the quality of the environment where they live or learn. Continuing he stated that learning is more than education provision and that the community in which learners live have a profound impact on their aspiration to learn, their curiosity and their desire to develop their own competency.

This implies that no society is void of environmental influences. The desire for both qualitative and quantitative education has multiplied the problem of providing an effective and conducive learning environment for teaching and learning. In Nigeria, there is an increase in the number of students' enrolment in schools with little or no regards to improving the learning environment so as to better their performance. In the light of this, many advocates call for better ways of handling the teaching and learning of computing education.

## **2. THE CURRENT STATE OF TEACHING AND LEARNING OF COMPUTING EDUCATION IN NIGERIA**

With the introduction of the national policy on education i.e. (6-3-3-4) system, the students, teachers to some extent became aware of the need to develop necessary useable skills required to operate our various industries (Idialu, 2014). Subjects taught are offered with the aim of training the students in various skills and competencies required for their future developments. Osuji (2004) asserted that government strongly believes that the objectives of job creation and poverty reduction can only be realized through appropriate education which empowers the product of the education system with skills and competencies to become self employed. However, this hope can only be achieved if the computing subjects are well taught and appropriate learning environment created in our schools at various levels.

For the teacher to effectively teach students to learn new things and get better ways of doing things depends on many factors such as instructional/teaching aids; conducive environment for learning; adequate/qualified teachers; Students willingness to learn, etc. Dykman (2000) articulated the following challenges facing computing education practitioners today hence made teaching/learning of computing education difficult. This includes Lack of infrastructural development/instructional materials for computing education courses; Declining teacher education enrolment and poor teacher quality; Low incentive for teachers; outdated curriculum to meet the yearning of the present Information Technology (IT) world. Other challenges include Ill-equipped libraries; Ill-equipped laboratories; High Students-teacher ratio; Low interest of learners; Teacher-centered method of teaching and high level of examination malpractice.

Currently, most Computer Science departments in our higher institutions do not have well equipped laboratories and usable infrastructures. Where these exist, they are grossly inadequate, obsolete and in a dilapidated state. Oduma (2007) posited that what is seen and referred to as computer laboratories in various institutions today are eye-sores as the laboratories only have systems that were provided at the point the departments were established. It is however a statement of fact that most computer science departments still depend on their students to provide the learning aids during programming and practical courses. Opeoluwa cited in Dokubo and Dokubo (2013) indicated that only 40% of tertiary institutions in Nigeria have laboratories for computer science programmes.

They further stated that 60% of other institutions do not have laboratories and this affects the low quality of technology programmes in higher institutions. The researchers concluded that this situation is partly responsible for the reason why it has been increasingly difficult to carry out research effectively by students and thus making the teaching and research in computer science more difficult. However, the country turned into producing insufficient, unqualified and ill-prepared computer science graduates who ordinarily are supposed to be the driving force for the economic and industry transformation of the country as experienced in developing countries like China and Turkey. This inadequacy in the field of teaching, laboratory and workshop facilities has contributed to poor performances on the part of students.

## **3. PEDAGOGICAL IMPLICATIONS OF ILL-EQUIPPED ENVIRONMENT FOR COMPUTING AND IT**

Learning can be termed as the change in behavior that is brought out by the adaptation of different experiences, information, and motivation. It can also be defined as the development of the capabilities of an individual. Learning is not something that is static, but it is a factor that can be developed during the lives of students and keeps on changing with their age and results in finding out how that knowledge can be used. While teaching means to help students to learn something in a school, College, University by giving lessons (Rundell, 2005). It is a known fact that no meaningful teaching and learning can take place in an environment that is ill-equipped.

The learning environment determines to a large extent how a student behaves and interacts, that is to say that the environment in which we find ourselves tend to mould our behaviour so as to meet the demands of life whether negatively or positively. Several studies have revealed that most of our schools are facing ill-equipped environment which include inadequate/deteriorating infrastructural facilities, inadequate funding, shortage of training personals, among others. These challenges have implications for the quality of teaching and learning of computing education in our society today.

The implications include:

- **Slow Pace of Learning and Application of Computer:** In our quest towards scientific and technological advancement, we need nothing short of good academic performance at all levels of schooling. In view of this, education systems in individual countries need to be tailor-made to suit this endeavor. The study of computer in school is therefore, aimed at helping the students cope with modern technological development, equip them with knowledge and competencies or skills of programme and administrative management, as well as improve the learning process. Students on the other hand, are expected to master the skills of computer appreciation or application and not just what it is and can do. Students are therefore, expecting to be taught in such a way as not only to conceptualize and understand the computer, but also to be able to effectively manage their own learning, reinforce it and apply such knowledge or training in practical situation (Ehondor and Omoruyi, 2013). It has been observed that the teaching and learning of computer in schools has not been quite easy (Adamu, 2000). Currently, there is an increase in the number of students' enrolment in schools with little or no regards to improving the learning environment so as to better their performance. Ebeledike cited in Eze (2010) investigated environment correlation of student in secondary school in Ahaocha, Anambra State. The researcher found out that there is a relationship between learning environment and students' productivity. The slow pace of learning and application of computer had been attributed to inadequate facilities and computers instructional resources for teaching and learning exercise. This implies that no society is void of environmental influences. The researchers concluded that this situation is partly responsible for the reason why it has been increasingly difficult to carry out research effectively by students and thus making the teaching and research in computer science more difficult. Consequently, this situation has affected the production of skilled manpower since the current learning environment cannot in any way guarantee effective delivery of computing education. In the light of this, many advocates call for better ways of handling the teaching and learning of computing education.
- **Poor Students' Interest in the Discipline:** While computer science continues to permeate every aspect of society, the number of students adequately prepared for, choosing to pursue, and successfully completing computer science undergraduate programs is still dismal (Washington et. al, 2015). A learner's reaction to education determines the extent to which he or she will go in education. A healthy and attractive school environment makes for conducive learning and promotes students pride in their schools and their interest to stay in school, as well as enable them specialize in any area of their choice (Mgbodile, 2004). Belanger in Eze (2010) writing on the importance of learning environment stated that people's educational life histories are influenced not only by provision of learning opportunities, but also by the quality of the environment where they live or learn. Continuing he stated that learning is more than education provision and that the community in which learners live have a profound impact on their aspiration to learn, their curiosity and their desire to develop their own competency. Computing educators are ill-motivated, which will in turn affect their performances in instructional delivery with the attendant effect of reducing the students' interest in the discipline. A student may like a particular subject very well but because of the poor teaching method/environment of the teacher, such a student may lose interest for such a subject or course (Ohiwerei and Nwosu, 2009). In addition, lack of adequate teaching methods by the teacher may lead to failure and subsequently lead the students displaying poor attitude to a course to choose another course which may not suit his ability. That is why Hall (1989) believes that there is a need to create an enabling environment that will motivate students so as to arouse and sustain their interest in school learning. Students are more motivated to work hard if the teacher/learning environment makes them to see the value or have interest of what they are learning to their overall course of study. Based on the foregoing, research on school learning should be considered a continuous process until there is evidence of improvement in interest and achievement of the learners particularly students in computing.
- **Hampers Societal Development:** Generally in the whole world, particularly in Nigeria, Education has been accepted as a veritable instrument for national transformation and development. It is an empowerment tool for both individual and national growth. In the medieval period, the French, the Spartans and the Greek utilized education to survive as a nation and produce the ideal citizens, by formulating and implementing policies targeted at the attainment of desired societal goals. It is on this premise that the Nigerian government sought to introduce computer studies in the education system from primary through to tertiary institutions. Many have had high expectations for the impact of computing education on societal development. By and large, these expectations have not been realized. The interlink between education and society cannot be overemphasized as the education obtains in a society is determined by the nature of that particular society, and the society itself is a product of the education acquired by the citizenry (Ogonor, 2017). In Nigeria, Computing education is operating in an ill-equipped environment. As a result, Computer Science graduates would definitely graduate without acquiring the requisite skills and competencies that would make them become self-reliant. The aftermath effect of this would be bottleneck in societal development.

Given this scenario, fears are that technological development may be a pipe dream for the country. Thus, our computing educators should focus on enhancing these skills of students to make them capable of facing the changing technology world rather than memorizing the theories. However, the attainment of an effective and efficient educational system is predicated on the deliberate and purposeful harmonization, interplay and contribution of all stakeholders of the educational system in the administration of education. This implies that government, the communities, the school administrators, parent, teachers and students must form a synergy in evolving an effective and efficient educational system, in other to make the ongoing quest a success.

- **High Rate of Unemployment:** Computing Education programme is relevant in Nigeria due to few organisations, industries and businesses that employ the youths, thus, the burden of employment in the Country lies mainly on the Government. This lack of employment generating agencies has led to high rate of unemployment in the Country since the government alone cannot absorb all the graduates. Computing education is being advocated because it is certain that computer literacy will have as much impact on career opportunities in this fast growing information age (Adamu and Bello, 2002). Osuji (2004) asserted that government strongly believes that the objectives of job creation and poverty reduction can only be realized through appropriate education which empowers the product of the education system with skills and competencies to become self employed. However, this hope can only be achieved if the computing subjects are well taught and appropriate learning environment created in our schools at various levels. Evidence of unemployment and under-employment in the Country remain at a high level. It is commonplace to see graduates roaming the street five to seven years after graduation without job. According to Owenvbiugie and Ediagbonya, (2014), youth unemployment has continued to be on the increase. The records also show that over 60% of the unemployed persons in Nigeria had Bachelor Degree (B.Sc) inclusive of computer science graduates. From the above report, it therefore means that the computer science student go about in search of jobs that do not exist, thus, increasing the rate of unemployment in the Nigeria. The implication of the above statistics is that Computer science programme, which aimed at graduating knowledgeable, skilled, and competent individuals that can be self-employed and also create jobs in the society; thereby reducing the unemployment situation in the country is not meeting up with her objectives. Also, the Computer Science graduates obviously lack the requisite skills and competencies to work in the contemporary, dynamic and technology-driven environment (Idialu, 2007), which is also attributed to the ill-equipped environment under which computing education is imparted, and hence unemployable.
- **Increased in Social Vices:** Every society across the globe has its peculiar problems and challenges. Nigeria is not an exception. As a developing nation, she faces her own share of social, political, economic and cultural problems which has in no small measure affected the well-being of the populace. Such problems according to Adebayo (2013) include bedeviling social vices which have serious implications for national development. They include prostitution, armed robbery, thuggery, militating and so on. Social vices are dysfunctional as they threaten the stability of society and therefore, require a concerted effort towards finding a lasting solution to it. One major contributory factor to increase in social vices especially in Nigeria is lack of employment opportunities especially among the youths. The lack of employment opportunities or perhaps the high rate of unemployment as earlier stated is a function of educational institutions producing graduates who are deficient in skills and competencies required in contemporary ICT organizations and hence unemployable. This is obviously due to the ill-equipped environment in which computing education in particular and other educational programmes in general operate. Moreover, the rate of poverty, corruption and so many other social vices has become worrisome to the government and to every well-meaning citizen despite the introduction of Computing Education in the school curriculum. This state of affair is of great concern to the researcher and if this trend continues, it will leave no one in doubt to question the relevance of Computing Education in the School Curriculum.

From the fore going, one can see that school environment plays a crucial role in academic achievement of a child. This problem of low productivity of students is more pronounced in ill-equipped schools hence learning environment should not be neglected. It means that environment has a strong influence in teaching and learning processes. Moreover, effective teaching can only take place in an environment that is organized, motivating and peaceful. To achieve the objectives of computing/information technology, there is need to create an enabling environment that will create opportunity for high quality learning which will be evaluated through performance at the long run.

#### 4. CONCLUSION/RECOMMENDATIONS

Computing education is of paramount importance to national development and it is on this premise that the Nigerian government sought to introduce computer studies in the education system from primary through to tertiary institutions. Many have had high expectations for the impact of computing education on societal development. By and large, these expectations have not been realized. It has become evident that several factors such as learning environment has tremendous influence in the quality of teaching students receives and the extent of attention they pay to lesson in school. This implies that schools with ill-equipped environment hardly put in the best in their students especially in the area of student productivity. This scenario has been among the reason for poor academic achievement of students in computing.

From the foregoing discussion, there is a great need to create an enabling environment for the teaching and learning of computing education that is crucial to helping students in high academic standards, improved quality in teaching and learning. Since computer education is paramount in National developments, all those concern should make real effort to creating an enabling environment for the teaching and learning of computing education considering the value of quality computing education.

To this end, the following recommendations are made:

- I. Government at all levels should stop paying lip service to education and provide the necessary finance to provide the resources required for education to enable it achieve its objectives.
- II. Government should provide the necessary facilities, equipment and infrastructure needed in the effective teaching and learning of computing education.
- III. There should be an improvement in the competence, resourcefulness, and efficiency of computer educators and other personnel through training, capacity building, and motivations.
- IV. More emphasis should be placed on acquisition of practical knowledge and skills rather than theory and certification.
- V. There should be proper administration and supervision of the schools and learning program to ensure that the desired goal is achieved also to promote hard-work and discipline in schools.

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