

# Investigating Problems Militating Against the Use of Information Technology in Learning Physics in Secondary Schools

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## **Abstract**

*Information Technology (IT) has currently taken the center stage in this century, considering its enormous benefit in every human endeavour, especially in the education system. Despite the impact of using IT in learning Physics on science, technology and society little or no use of IT in learning Physics in Nigerian secondary schools seem to be achieved. This work attempts to investigate the problems militating against the use of IT in learning Physics in Nigerian secondary schools. The mean and standard deviation, measures of central tendency, are employed to provide solutions to the research question. Findings from the study indicate the availability of problems that militate against the use of IT in learning Physics. Such findings include the non-availability of IT gadgets in secondary schools. Suggestions to remedy the situation are proffered.*

**Keywords: Information Technology (IT), Learning Physics with IT, Learning Problems.**

## **Background of the Study**

The beginning of the 21<sup>st</sup> century was confronted with a shift in emphasis from Science and Technology to Information Technology. This, however, does not imply that Science and Technology have been relegated to the background, but that Information Technology has been discovered as a tool for facilitating the growth of Science and Technology. Today, the term Information Technology has ballooned to encompass many aspects of computing and Technology, and the term is more recognizable than ever before. The Information Technology umbrella can be quite large, covering many fields including education. Information Technology is increasingly becoming the fact of everyday life, particularly in the developed and some developing countries. According to Berenfeld (1999), Information Technology has changed how people live, work and play in such countries.

Information Technology (IT) is an aspect of technology that is an integrated application of computer and telecommunication technologies in finding solutions to problems. Tinio (2002) defines IT as a “diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information”. IT deals with the use of electronic computers and computer software to convert, store,

protect, process, transmit, and securely retrieve information. According to Gupta and Ansari (2007) components of IT include computer hardware technologies, computer software technologies, telecommunication and network technologies, and data resource management technologies.

In the wave of change that is sweeping across the world, education (particularly science education) is not left out. Most of the developed countries have exploited the potentials of IT to transform their education landscape at all levels of education. Generally, IT provides opportunity to revolutionize pedagogical methods of instruction, expand access to quality learning, and improve the management of educational systems.

IT has enormous impact in all aspects of human life in a very profound manner. There is hardly any undertaking that has not been greatly and positively affected by the recent development in IT. For instance, the application of IT in education has richly affected the educational system. It is worth noting that the computer is the latest technology for managing information and therefore, is the dominant technology for IT. Ivowi (2002) categorizes the importance of IT in the teaching/learning process into two, viz: instructional strategy and knowledge resource.

As an instrument for instructional strategy, IT can be used to teach Physics concepts to students. Most international editions of Physics and other Science textbooks, including dictionaries, are accompanied by CD-Rom software that contain oral lessons on how to pronounce some technical words, worked examples, models and animations of science concepts being taught. Other programmes and websites like the Addison-Wesley Tutor center, Infotrac- the online library, Mastering Physics™ Active Physics online™ and Active Physics online™ workbooks are only accessible through IT where both teachers and students could update their knowledge and acquire current information on science researches and discoveries.

In Physics, some computer software programmes like AutoCAD and Maya can be used to make some designs, models and even animations that could be used as instructional materials for the teaching and learning of some abstract topics. Such topics include atomic structure, motion of electrons in orbits (shells) around the nucleus, molecular structures, collisions (elastic and inelastic), the motion of molecules and kinetic theory in thermodynamics. For effective study of Space Physics or Astrophysics a space center (or observatory) is required. Nigeria has only one of such facilities, Nigeria Space Centre (NSC) in Abuja. However, some software like the planetarium software (CD-Rom) which give a survey of the solar system and the universe are aids in the study of Space Physics.

With IT as an instructional strategy, students' interest is sustained and Physics concepts concretized using different resources at a pace that appeals to each student. Individual differences of the students are accommodated such that both slow and fast

learners benefit from the instructional approach, as the process can be repeated several times (Ezeliora, 1997). Supplementing, Gusen (2001) notes that IT provides individual support, motivation and immediate feedback to the students, when used as instructional strategy. The use of IT enhances enriched and thorough comprehension of Physics concepts. It allows students to experience growth when they build on prior knowledge of Physics concepts. Students' scientific ability and attitude to Physics develops, when they actively investigate scientific phenomena using IT. The use of IT also takes care of the problem of the dearth of Physics teachers who are overloaded with work.

Effective Physics learning is dependent upon the availability and organization of materials, equipment, media and technology, which must be protected and maintained for optimum results. Ezeliora (2003) opines that students experience joy and excitement when browsing the internet for information and ideas. They have access to current and relevant textbooks and materials. The useful application of IT in the learning of Physics is enormous, motivating and captivating to the learner. However, it is sad to mention that most Nigerian students are yet to benefit from the use of IT in learning. Studies have shown that many problems in Nigeria hamper the effective use of IT in learning (Abimbade, A, 1999; Achor, E.E, 2003 Adebayo, A.A., 2002; Ogu, M.N, 2003; Okafor, N, 2003; Onimisi, J.A, 2003).

### **Statement Of Problem**

The world is now perceived as a global village with the countries as hamlets. In this village, no hamlet should afford to trail behind in information dissemination. In many countries today, the use of IT has become so important in managing and disseminating information that it has now become the most significant index of their socio-economic development. This quest for rapid socio-economic growth may not be achieved without a significant contribution of IT in the teaching/learning process.

The awareness of the use of IT as an instructional strategy in the teaching/learning process in Nigerian secondary schools began about 18 years ago. In his keynote address to the 43<sup>rd</sup> Science Teachers Association of Nigeria's annual conference and inaugural conference of CASTME Africa in 2002, the then Nigeria's Minister for Education stated that the Ministry of Education in Nigeria "introduced computer studies in secondary schools by the year 1990". Nigeria's efforts so far to step into the information explosion age is nothing to write home about. This situation has adversely affected the educational system at all levels. Studies indicate that the use of IT as an instructional strategy is yet to be achieved in schools (Chukwu, Ajere and Afolabi, 2003; Babajide and Bolaji, 2003; and Lawal, Ahmadu and Dogara, 2003).

It is on the basis of the afore-mentioned that this work is delving into finding out problems militating against the use of IT in learning Physics secondary schools.

## Purpose Of Study

The purpose of this work is to examine the problems militating against the use of IT, as instructional strategy, in learning Physics in Nigerian secondary schools.

## Research Question

The research question to be answered in this study is: What are the problems militating against the use of IT in learning Physics in secondary schools?

## Method

**To carry out this research, the cross-sectional survey which is a survey research design was adopted.**

The study population consisted of all the senior secondary school (SSS) III Physics students (360) in all the secondary schools (12) in Pankshin Town of Pankshin Local Government Area of Plateau state.

The sample for the study was made up of 100 Physics students drawn at random from the population (200) using the lottery method of the simple random sampling technique, from five secondary schools that were earlier selected randomly

A 13-item students' use of IT in learning Physics questionnaire (PHYSIT) was developed by the researchers and face-validated by two experts. PHYSIT was designed to find out the availability of IT equipment in schools, ability of students to operate IT gadgets, adequacy of facilitating structures, security of IT facilitating structures, adequacy of Physics teachers, and students' interest in learning Physics with IT gadgets. The items were scored on the four-point scale.

The researchers personally administered PHYSIT to the sample and retrieved same on the spot. The tool of analysis was the descriptive statistic of mean and standard deviation.

The criterion mean,  $\bar{X}_c$ , was also used to determine which problem militates against the use of IT in learning Physics. It is the mean of the four-point scale.

$$\bar{X}_c = (4+3+2+1) / 4 = 2.5$$

Since  $X_c = 2.5$  the following decision was taken:

- i. Accept as a problem if the calculated mean is equal to or greater than the criterion mean.
- ii. Do not accept as a problem if the calculated mean is less than the criterion mean.

## Result

Table 1 shows the Mean analysis and rank performed on the respondents who responded to PHYSIT

**Table 1:** Mean analysis and rank performed on the responses of students who responded to PHYSIT

S/No	Items	SD	$\bar{X}$	$\bar{X}_c$	Decision	Rank
1	Inability to operate IT gadgets	9.709	3.40	2.50	Accepted	2.00
2	Unavailability of IT gadgets	9.683	3.65		Accepted	1.00
3	Inadequate facilitating structures	9.714	3.35		Accepted	3.00
4	Insecurity of IT facilitating structures	9.799	2.50		Accepted	5.00
5	Students' lack of interest in learning physics with IT gadgets.	9.819	2.30		Rejected	6.00
6	Inadequate Physics teachers	9.749	3.00		Accepted	4.00

From table 1, it can be observed that there are problems militating against the use of IT in learning Physics in secondary schools ( $\bar{X}$  being less than  $\bar{X}_c$  for only one problem). These are inability to operate IT gadgets, unavailability of IT gadgets, inadequate facilitating structures, insecurity of IT facilitating structures and inadequate Physics teachers. The only problem that was not accepted as a problem in this study is 'students' lack of interest in learning Physics with IT gadgets'.

### Summary of Major Findings

The major findings in this research are:

- IT gadgets are unavailable in secondary schools.
- Students are unable to operate IT gadgets.
- IT-facilitating structures in schools are inadequate.
- Physics teachers in schools are inadequate
- The few IT-facilitating structures available in schools are insecure.

### Discussion of Findings Unavailability of IT gadgets

This is seen as the greatest problem militating against the use of IT in learning Physics in secondary schools (ranked first in Table 3). 90% of the respondents attested to the non-availability of IT equipment in schools as a problem militating against the use of IT in learning Physics. From the analysis, it is vivid that IT gadgets, which can be used for effective learning of Physics, are grossly inadequate. According to Onimisi (2003) this is a challenge to Nigeria as presently there is a high under achievement in school science and technology due to the unavailability of or low supply of Computers in schools.

### **Inability to operate IT gadgets**

From table 3, the inability of students to operate IT gadgets (ranked second) is a problem militating against the use of IT in learning Physics in secondary schools. 75% of the respondents indicated their inability to operate IT gadgets is a hindrance to the use of IT in learning Physics. The inability of Physics students to operate IT gadgets is a consequence of teachers' incompetence. According Ogu (2003) one of the requirements for effective use of computers in education is the availability of experts to develop course material/wares. Unfortunately, in Nigeria, most Physics teachers teaching secondary schools are incompetent in the use of IT for teaching.

### **Inadequate IT-facilitating structures**

The third-ranked problem militating against the use of IT in Physics learning is the inadequacy of facilitating structures such as computers, telecommunication and power supply, 80% of the respondents attested to the inadequacy of IT facilitating structures in schools. 90% and 100% of the respondents attested to the insufficiency of power supply and the lack of internet services in schools, respectively. The effective use of IT in learning demands the provision and availability of facilitating structures such as electricity and telecommunication systems. According to Adebayo (2002) and Ogu (2003) in Nigeria unsteady power supply or none at all in rural schools and lack of efficient and functional telecommunication systems may have hindered the use of IT in learning Physics.

### **Inadequate Physics Teachers**

This problem is the fourth-ranked obstructing the use of IT in learning Physics. 60% of the respondents were of the view that there is dearth of Physics teachers in secondary schools. Nigeria, as a developing nation, needs to acquire and utilize IT in addressing the current inadequacies staring the education sector in the face. Onimisi (2003) opines that there is shortage of quality teachers in schools which has resulted in high under achievement in science and technology subjects.

### **Insecurity of IT-Facilitating Structures**

The lack of enough security to IT-facilitating structures such as computer and telephone is the fifth-ranked problem militating against the use of IT in learning Physics. 50% of the respondents agreed to the problem of insecurity of IT facilitating structures as affecting the use of IT in learning Physics in schools. According to Achor (2003), Nigeria has additional battle of providing adequate security, inter alia, to IT-facilitating structures.

### **Students' Lack of Interest in Learning Physics with IT Gadgets**

Although 30% of the respondents (Table 3) attested to students' lack of interest in learning Physics with IT gadgets as a problem, this problem cannot be accepted as one

militating against the use of IT in learning Physics. This is because the criterion mean is greater than the mean of the responses.

### Recommendations

- Physics teachers should be encouraged to learn how to teach Physics using IT gadgets. This will take care of the dearth of Physics teachers in secondary schools, since a large class of Physics students can be effectively taught using IT gadgets.
- Good supply of computers and other IT facilitating structures such as internet should be provided by stakeholders to all secondary schools in Nigeria. This will greatly facilitate the learning of Physics.
- There should be an alternative power supply to empower IT facilities in schools, especially in rural areas and places where there is short, fluctuating or no supply of electric power. Such alternative power sources as generators and solar panels should be installed.

### Conclusion

Information Technology is playing a crucial role in contemporary society. Therefore, Nigeria needs to get linked up with the rest of the world by joining the information trend in the world so that it will experience appreciable growth in the global socio-economic sphere.

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