

APPLICATION OF COMPUTER- BASED RESOURCES IN SENIOR SECONDARY PHYSICS EDUCATION: THE JOURNEY SO FAR

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Abstract

The study investigated the extent of application of computer based resources in senior secondary physics education. A random sample of 32 secondary schools in Uyo senatorial district of Akwa Ibom State was used for the study. The Extent of Application of Computer Based Resources Questionnaire (EACBRQ) was used in gathering data. The data collected were analysed using the descriptive statistics of mean (\bar{x}) and standard deviation (δ) to answer the research questions. Research findings showed that physics teachers in Uyo Senatorial District of Akwa Ibom State have not yet applied computer in the implementation of senior secondary physics curriculum; the introduction of computer-based resources was, therefore, impossible. It was recommended that government should stipulate a clear-cut policy on application of computer-based resources in senior secondary physics, building-in a time tested, follow-up mechanism to ensure implementation of the policy.

The delivery mode of senior secondary physics curriculum, in Akwa Ibom State has been under intense criticism, calling for a paradigm shift from the conventional teacher-centred instruction to the constructivist students-centred learning, since the advent of computer-integration in education, more than two decades ago. Infact, changes in the global market economy have imposed changes in educational goals such that physics education is obliqued to equip students with computer-based ICT skills that allows for self-development and continuous

learning, as well as higher cognitive skills such as problem-solving and thinking skills, capable of meeting the competitive global economy of ICT age. According to Ministry of Education Science and Technology (MOST) (2005):

There are several benefits for integrating computers into secondary education as students in this age need to focus on subject-specific content, greater critical thinking skills as well as scientific inquiry. Students may benefit greatly with the analytical, creative and collaborative power of computers to map out and analyse assumptions, present ideas and collaborate in projects with peers from around the country and around the world. (P. 221)

Senior secondary physics is largely experimental, requiring a well –furnished laboratory for effective delivery. Regrettably, shortage of laboratory facilities, in most Nigerian secondary schools, is an influential factor restricting the advancement of students hands-on, minds-on comprehension in physics learning. This problem can be overcome by computer simulation, which allows students to set up an experiment and perform different simulations. The animation involved in these activities allows abstract topics in physics to be learnt from a more visual approaches. Simulation demonstrates a phenomenon (e.g. photoelectric effect) that cannot be viewed visually in any other way but by means of computer imitation. Nonetheless, virtually all physics laboratory experiments can be performed by means of computer simulation. This tremendous advantage

is made possible by application of computer-based resources.

The continuous growth of computer-based resources allows wide integration of computers in virtually every stage of the teaching process; a good number of teachers are still standing aloof, if not detached, from this new world of Information and Communication Technology (ICT); and these are those who must begin at the definitional level of ICT resources if they are to be carried along in this global quest for computer application in education. In response to this sorry reality, a handful of relevant, fundamental definitions/ explanation are hereby provided.

UNESCO (2002) defined Information and Communication Technology (ICT) as the range of technology that are applied in the process of collecting, storing, editing, retrieving and transferring of information in various forms. According to NTI (2000), Information and Communication Technology (ICT) is generally taken to mean technologies that support communication via computers. This implies the internet, e-mail and World Wide Web technologies.

A computer has been defined (NTI, 2000) as a special multipurpose electronic device (machine) that is capable of receiving instruction (data), storing and processing it and giving a desired result as output, accurately, at an incredibly high speed. Computer-based resources are materials or devices that are accessed, delivered or deployed via a computer for the purpose of facilitating teaching and learning. Computer-based resources in this context are: the internet, search engine, worldwide web, LCD projector and electronic mail software. Others include: CD-Rom, electronic spread sheet, word processing software, the printer, uninterruptible power supply (UPS) and the computer itself.

The Internet, Internet-Connection Software and the Search Engine

The internet is a system of international or worldwide assemblage of interconnected computer network, for information interchange. It consists of computers permanently joined together through high speed connections for information super high way. Internet- connection software enable students to establish a connection between the computer and the internet (NTI, 2000). A search engine (e.g google, yahoo) is an electronic device that is used to seek information on the internet.

The Worldwide Web and the Web Browser Software

The World Wide Web (www), usually called the web is a global collection of multimedia documents and files, which are stored on computers connected to the internet. It is an avenue on the internet whereby an individual or organization presents its products and services. It is basically an internet application for publishing text, graphics and other types of information globally and for browsing by students with a web browser. Because the web, and the browser software used to access it, allow graphics, sound and even video to be displayed, it has becomes the most important internet resource.

Internet browsers are software programmes that provide you with the ability to navigate the internet, locate data and access the world wide web.

LCD Projector

LCD projectors allow teachers to bring the World Wide Web into the classroom. It can be used to access a learning object on the web to perform an interactive demonstration with the students. It can be used to project a grid on the white board to construct a graph. It is an avenue that allows physics teachers to introduce different types of softwares enabling students to

learn from a more visual approach. The LCD projector and the computer are instrument to web-based (internet) information.

Electronic Mail (E-mail) Software

With the e-mail software, letters (texts), graphics and sound are transported across the world through the internet within seconds and they arrive safely and you are notified that the mail has arrived safely and when applicable or that there is a delivery failure.

CD-ROMS: Electronic Spread Sheet, and Word Processing Software

CD –ROMS are used for storing and distributing large data sets of numerical, graphical or catographical information. It can also be used for giving students active, hands-on, interactive experience in analyzing information or solving problems. Electronic spreadsheet software has columns, rows, cells, cell addresses and cell pointer, etcetera. “professionals in mathematics, engineering, science, medicine, the arts, social science and education find the spreadsheet to be a natural tool for modeling, implementing and analyzing algorithms, constructing laboratory reports, carrying out statistical analysis and producing graphic displays (NTI, 2000). Word processing softwares are used for processing, editing, storing, spelling-checking and printing of documents. Electronic machine used for this purpose is called word processor.

The Printer and Uninterruptible Power Supply

The printer is an output device used to make a copy of computer output on a paper. The uninterruptible power supply (UPS) is a backup device that can sustain your work a long time to enable you save your work against power interruption.

From the afore-going, the provision of computer-based, constructivist education entails

a mandatory assemblage of computer hardware (physical components of a computer) and software (programmes processed by hardwares), as well as an interruptible power supply. Nonetheless, this paper goes beyond this issue.

The Problem

Computer-based technology is used as the engine for sustainable education, employment generation, wealth creation, poverty reduction and global competitiveness. Accordingly, there is a dramatic proliferation of computer-based resources in the market today. NTI (2000) noted that the use of computer-based resources in education is on the increase today, prompting students to learn more on internet while many teachers use hypermedia and interactive multimedia software that put the students in control of the class. Interestingly, Smeets (2005) posited that research studies show that most teachers do not make use of the potential of ICT to contribute to the quality of learning environments, although they value this potential quite significantly. Which of these scenarios (NTI 2000 or Smeets 2005) is applicable to physics education today, is yet a puzzle. The aim of this paper is to resolve this puzzle. Specifically, the objective of this research study is to investigate the extent of application of computer-based resources in senior secondary physics education in Uyo senatorial district of Akwa Ibom State.

Research Question

To what extent have computer-based resources been applied in senior secondary physics curriculum delivery in Uyo senatorial district of Akwa Ibom State?

Research Methodology

The study adopted a survey research design. The population of the study consisted of all the estimated 120 physics teachers in all the public secondary school in Uyo Senatorial

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District of Akwa Ibom State. A simple size of 92 physics teachers drawn from a random sample of 32 secondary schools in Uyo Senatorial District, was used for the study.

A research instrument, known as Extent of Application of Computer-Based Research Questionnaire (EACBRQ) was used in gathering data for the study. The questionnaire was developed by the researcher, and face-validated by two physics education lecturers, the EACBRQ was a 12-item, 4-point, Likert-type Scale of: Very Good Extent (VGE) =4 points, Good Extent (GE) = 3 points; Meager Extent (ME) = 2 points; and Not at All (NAT) = 1point. The data collected were analyzed using the descriptive statistics of means (\bar{x}) and Standard Deviation

(δ). The following cut-off points for mean scores were used in interpreting results:

- 1. 00 - 1.40 = NAT
- 2. 00 - 3.40 = GE
- 1.50 - 1.90 = ME
- 3.50 – 4.00 = VGE

Results

Research Question: To what extent have computer-based resources been applied in senior secondary physics curriculum delivery in Uyo senatorial district of Akwa Ibom State?

Table I: Analysis of Extent of Teachers Application of Computer-based Resources in Senior Secondary Physics (N = 92)

S/N	Computer-based Resources	Level of Application		
		\bar{x}	δ	Remark
1	Computer	1.40	0.66	NAT
2	Internet	1.22	0.40	NAT
3	Search engine (e.g. google, yahoo)	1.27	0.90	NAT
4	World wide web	1.08	0.85	NAT
5	Web browser software	1.04	0.76	NAT

6	LCD projector	1.23	0.55	NAT
7	Electronic mail software	1.28	0.78	NAT
8	CD – Rom	1.00	0.64	NAT
9	Electronic Spreadsheet	1.10	0.38	NAT
10	Word processing software	1.25	0.48	NAT
11	Printer	1.35	0.95	NAT
12	Uninterruptible power supply	1.31	0.88	NAT
Overall		1.27	0.69	NAT

In Table I, the mean scores of teachers application of computer-based resources range from 1.00 to 1.40. This shows that physics teachers in Uyo senatorial district of Akwa Ibom State have not yet applied computer in the implementation of senior secondary physics curriculum. The introduction of general purpose and curriculum focused, computer-based resources (search engine, worldwide web, LCD projector, CD-ROM) was, therefore, impossible.

The small standard deviation values (range 0.38 to 0.90) signify cohesiveness (closeness and agreement) in the ratings of the individual teachers, across all the computer-based resources.

Discussion

The study found that, computers are not being integrated in the teaching of senior secondary physics and that secondary schools in Uyo Senatorial district of Akwa Ibom State are not provided with internet facilities. This finding is in agreement with Nwosu (2003) finding that secondary schools in Nsuka urban of Enugu State have very few computers which are used for administrative purposes, rather than for educational (instructional) purposes. This finding collaborates Dugaryil, Duguryil and Katmyon’s (2006) who stated that available computers found in the school were used for administrative purposes. None of these schools were found to be connected to internet. This deprives the students and teachers of the benefits derivable from these ICT resources.

This is in line with Smeets's (2005) observation that most research studies show that most teachers do not make use of the potential, of ICT to contribute to the quality of learning environment, although they value this potential quite significantly.

Summary/Conclusion

In Uyo senatorial district of Akwa Ibom State, the extent of use of computer-based resources in senior secondary physics is, virtually, nil. The available computers in secondary schools in this senatorial district is basically for administrative purposes. As for the transition from the conventional teachers centred learning, which calls for integration of computer-based resources in physics curriculum deliving, the journey is yet to begin.

This deprives the students the opportunity of benefiting from the enormous potential derivable from these ICT resources – contributing to the quality of learning environment.

Recommendations

Based on the findings of the study, the following recommendations are made

1. Government should stipulate a clear-cut policy on application of computer-based resources in senior secondary physics, building-in a time- tested, follow-up mechanism to ensure implementation of the policy.
2. There should be a computer to student ratio of 1:2; and every physics teacher should be provided with a laptop computer, as well as access to internet facilities.
3. Physics teachers should be trained on integration of computer in physics curriculum implementation so that they (physics teachers) become confident in using computers in teaching. To do this, teachers

will become confident, and creative users of ICT, and at the same time teachers must have access to professional development programmes in the use of technology and in task design.

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