

ICT in Teaching and Learning Physics: Prospects and Challenges in Nigerian Educational Sector

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Abstract- Information and communication technologies (ICT) have become common place entities in all aspects of life. The use of ICT such as Internet applications, CD-ROMs, video technology and various computer attachments and software programs have caused many changes in society. This paper reviewed various applications of ICT in effective teaching and learning of physics education; problems militating against using ICT in science education was highlighted. Suggestion was made for government to establish a well furnished ICT laboratories in all schools and many more.

Keywords- ICT, learning, teaching, physics, education.

I. INTRODUCTION

ICT is defined as a diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information [1]. ICTs is a collective term used to describe the various technologies that are used in the processing of information including its coding, creation, storage, retrieval, manipulation, dissemination and transmission [2]. According to [3,4,5] ICT is that components that aid the accessing, recording, arranging, manipulating and presenting data or information using tools and software. To [6] ICT is a diverse set of technological tools and resources used to communicate, create, disseminate, store, manage information and promote human activities. ICT is perceived to be a force to be reckoned with in the 21st century because it has caused and continues to cause major changes in the way we live as reported by [3]. Adeyemo [7] opined that the use of information and communication technology (ICT) is becoming an integral part of Education in many parts of the globe, Nigeria is not left behind as ICT gradually finds its way onto the educational systems despite chronic limitations brought about by economic disadvantages. Reference [3,8] are of the opinion that ICT came into being as a result of related technologies clearly stated by their functional usage in information access and communication is centralized through the Internet.

ICT has been changing every aspect of human life trade, manufacturing communications service, culture, entertainment, education, research, defense and global

security [9,10]. The present pedagogical pattern used in Nigerian classroom does not prepare students for the information, age and globalization, that is, it is not equipping students to live effectively in the modern age of science and technology [9].

Physics is regarded as an abstract subject by many people [7]. This may be due to the way the teacher teaches it [11,12]. If concepts in physics are taught very well with the aid of ICTs nobody would call it abstract subject again; it is true some mechanism may be complex to explain but technology has solved the problem through educational software. Educational software can be used to teach difficult concepts or observe difficult skills in physics [11]. In view of the above, this study aims to explore the prospects and challenges of using ICT in teaching and learning process of Physics in Nigerian educational sector.

II. IMPORTANCE OF ICT IN TEACHING AND LEARNING PHYSICS

The importance of ICT in education can not be overemphasize. Some of the benefit includes; improving the quality of instruction. Transforming the school by improving school management. Enhancing the tools and environment for learning because materials can be presented by using multimedia [13]. Increasing the quality of student learning through the access to the content through ICT facilities. The use of ICT in teaching and learning is to give better value to students. Teachers could use ICT in order to facilitate learning, critical thinking and peer discussions [14]. ICT

assist learners by developing cognitive skills, critical thinking skills, information access, evaluation and synthesizing skills [15,16]. ICT has the ability to improve efficiency in the educational process [17], memory retention, increase motivation as well as deepens understanding. ICT can be used to promote collaborative learning [13,18] such as role playing, group problem solving activities and articulated projects [18]. ICT allow the establishment of rich networks of interconnections and relations between individuals. ICT provides fast and accurate feedback to learners [19]. ICT promote deep learning and allow educators to respond better to different needs of different learners [20].

III. CHALLENGES OF ICT USAGE

Many studies have shown several obstacles that teachers experience in the integration of ICT in their classrooms either in teaching and learning physics or other science subjects. Reference [21,22,23,24,] found a number of barriers for the integration of ICT into lessons:

- Lack of confidence among teachers during integration.
- Lack of access to resources.
- Lack of time for the integration.
- Lack of effective training.
- Facing technical problems while the software is in use.
- Lack of personal access during lesson preparation.
- The age of the teachers.

According to [25,26] the following are major problems associated with the ICT use in education as related to students' learning:

- Over-reliance on ICT limits students' critical thinking and analytical skills.
- Students often have only a superficial understanding of the information they download.
- Computer-based learning has negative physical side-effects such as vision problems.
- Students may be easily distracted from their learning and may visit unwanted sites.
- Students tend to neglect learning resources other than the computer and the Internet.
- Students tend to focus on superficial presentations and copy from the Internet.
- Students may have less opportunity to use oral skills and hand writing.
- Use of ICT may be difficult for weaker students, because they may have problems with working independently and may need more support from the teacher.

IV. WAY FORWARD

Teachers should be able to create effective digital presentations using common tools for preparing slide shows, videos and podcasts [25].

Teachers should have the ability to differentiate instruction with digital media [25].

Teachers should be able to capture and edit images, audio and video [25].

Teachers should be able to produce digital multimedia educational experiences [25].

Teachers should be able to employ new media devices for teaching and learning [25].

Teachers should be able to create effective digital presentations using common tools for preparing slide shows, videos and podcasts [25,27].

Teachers should have the ability to communicate using digital tools [25].

The teacher should be able to choose the most appropriate research tools and databases, and applies the most effective search techniques, to produce useful and safe online resources in the classroom [25].

V. CONCLUSION

The use of information communication technology as additional instruments for teaching and learning Physics is lacking in Nigeria educational sector. There is urgent need for the development of an ICT friendly curriculum in Physics and other subjects in Nigeria Secondary schools. This will provide the pathway for easy application of ICT in teaching and learning

VI. RECOMMENDATIONS

ICT laboratories should be established in all schools and fund be made available to purchase computers and other ICT equipment.

More trained computer teachers should be employed and those physics teachers who are not computer literate should be mandated to go for computer training.

Government should make it mandatory for science particularly physics teachers to always attend seminar, workshop, conference and refresher course in computer.

Government should provide all physics teachers with laptop. Government should work hard to solve problem of power failure in the country.

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