ROLE OF ICT IN SCIENCE EDUCATION

ABSTRACT

Information and communication technology (ICT) has evolved to become a natural part of people’s lives in modern western information societies, where the Internet for instance is used to read newspapers, pay bills, keep in touch with friends and search for information for private and professional purposes. The enormous information flow available to the public, places high demands on people’s skills in being critical to information and various information sources. Science pervades many contemporary issues, not only in the form of core science, but also frontier science. Hence, ability to evaluate information with a science dimension for instance in terms of: Consistency between claims, reasons and evidence, the sample sizes when researchers are testing new medicines, calculation of risks when building nuclear power plants etc. is important and must be addressed in science education. Further ICT has in many ways become a powerful tool that has revolutionised the work of scientists. It is now possible to handle larger amounts of data, and more complex models and simulations can be developed and tested. The communication processes within the scientific community are speeded up because of easier access to research results in online scientific journals, and with access to the Internet, it is easier to collaborate with fellow researchers across geographical boundaries. These changes in the work of scientists should to a certain degree be reflected in science education. The place of ICT in teaching science education in schools cannot be over emphasized considering its promises in effective teaching and learning. This paper examine the role of ICT in teaching science education, its implication in both teaching and learning process and an attempt have been made to discuss the use of ICT in teaching and learning process.

Keywords: ICT; teaching science education; school; teaching and learning process

INTRODUCTION

ICT is an electronic means of capturing, processing, storing, communicating information. The use of ICT in the classroom teaching-learning is very important for it provides opportunities for teachers and students to operate, store, manipulate, and retrieve information, encourage independent and active learning, and self-responsibility for learning such as distance learning, motivate teachers and students to continue using learning outside school hours, plan and prepare lessons and design materials such as course content delivery and facilitate sharing of resources, expertise and advice. This versatile instrument has the capability not only of engaging students in instructional activities to increase their learning, but of helping them to solve complex problems to enhance their cognitive skills. To accurately understand the importance of ICT in Education there is need to actually understand the meaning of ICT. ICTs stand for information and communication technologies and are defined, for the purposes of this primer, as a —diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information. The dawn of the 21st century has brought about prominent changes in the way and manner in which society interact with itself. From the early stages of industrialization, the birth of the microchip to the ground breaking discoveries in wireless and fiber optic communication technology, humanity has always found a way to constantly improve upon its previous achievements. The academic environment, often labeled as “a society within a
society”, is also not left out. It refers to the socio-cultural behavior that occurs in any institution of learning and its constantly bombarded with evolutional and socio-cultural changes as a result of the fact that it is directly being shaped and controlled by larger societal needs/wants and vice-versa as Ulrich and Yesemin (2009) posited that higher education and research contribute technological progress, economic growth, societal wellbeing and cultural enhancement, thus making it apparent that the academic environment and the larger society are twin sides of the same coin.

Over the past decade, new dynamics have emerged in each of the key domains of higher education, these include: (i) demand; (ii) diversification of provision; (iii) changing lifelong learning needs; and (iv) growing Information and Communication Technology (ICT) usage and enhanced networking and social engagement, (Kearney, 2009), with explicit implications in science education.

As an educational and scientific discipline, science education concerns itself with the sharing of scientific content and processes with other academic disciplines not traditionally related to the sciences. Science on one hand refers to the process of knowledge acquisition through observation, studying and practice, while education on the other refers to the resultant effect of the application of knowledge. ICT, ICT is a diverse set of technological tools and resources used to communicate, and manage information. Science education could mean different thing to different people but one thing that is sure is combining of science knowledge with the study of education. Science education therefore implies acquiring both scientific knowledge and education to be able to share this scientific knowledge with individual or community who are not traditionally in science. Better still, science education is the study of biology, chemistry or physics with method of teaching in other to be able to impart scientific knowledge to any individuals or community. The moment methodology is excluded from learning of biology, chemistry or physics it is no longer science education but only science. Science education should be able to teach science concepts and also address learners’ misconceptions about these science concepts. Science education is very important to technological development of any nation because of its numerous benefits (Omosowo, 2009; Awolaju, Akinloye and Ilori, 2010). Developed nations of the world are not taking science education with loosed hands; they invent on it and that is why they remain developed. Nothing is static in the world again everything changes almost every second of the day; so should be educational activities (teaching and learning). Gone are the days when teaching and learning is only based on chalk and books packed somewhere called library; today everything has gone computerized to retrieved, store and transmit information.

The impact of ICT in science education cannot be overemphasized, it is interesting to note that

1. **ICT removes problems concerning space and time**
   - The students can communicate anywhere anytime.
   - The students can contact the teacher anywhere, anytime.
   - The student can collect and exchange information anywhere, anytime.

2. **ICT gives access to knowledge**
   - In principles, the students can draw on a global pool of knowledge.

3. **ICT makes serving and sharing knowledge easier.**
   - The students can individually and /or together create records notes and presentation and thus, register their progress and use it and examinations.
   - This way they are also trained for future participation global research communication. According to bell and Margaret (2006), the following benefit emanate from the use of ICT education.
   - Global access to knowledge.
   - Instant sharing of experience and best practice.
ICT IN SCIENCE EDUCATION

ICT has the potential to play an important role in making school science more relevant, interesting and motivating for students, and it offers opportunities to dissolve the boundaries between school and society. According to Linn (2003) students today need to learn how to search databases, interpret models, and critique electronic resources to succeed in school and in the workplace. Digital technologies offer new resources for learning, support new modes of instruction, and amplify opportunities for science education research. Osborne and Hennessey (2003), in their comprehensive overview: Literature Review in Science Education and the Role of ICT: Promise, Problems and Future Directions, propose a range of various ICT-tools for use in school science activities: multimedia software for simulation of processes and carrying out ‘virtual experiments’, publishing and presentation tools, digital recording equipment, computer projection technology, computer-controlled microscope and tools for data capture, data logging systems, databases and spreadsheets, graphing tools and .modelling environment. They further argue that these forms of ICT can enhance both the practical and theoretical aspects of science teaching and learning, and suggest that the potential contribution of technology use can be conceptualised in six ways:

EXPEDITING AND ENHANCING WORK PRODUCTION

Expediting and enhancing work production may offer release from laborious manual processes and more time for thinking, discussion and interpretation. McFarlane and Sakellariou (2002) suggest that computer-based simulations may provide better support for the development of theoretical understanding than practical work, for three main reasons: Firstly, the competence in handling an apparatus is no longer an issue, secondly the simulation can offer simultaneous representations of the real and the theoretical behaviour of the system under investigation for comparison and finally, the data sets generated can be more extensive than could be gathered experimentally by one group or class of students.

INCREASING CURRENCY AND SCOPE OF RELEVANT PHENOMENA

Increasing currency and scope of relevant phenomena by linking school science to contemporary science and providing access to experiences not otherwise feasible enhances the teaching of science. By using web-based learning materials, the authenticity is increased by continuously updating the content of the program.

SUPPORTING EXPLORATION AND EXPERIMENTATION BY PROVIDING IMMEDIATE, VISUAL FEEDBACK

The use of graphing or modelling tools provides dynamic, visual representations of data collected electronically or otherwise. Through providing immediate link between an activity and its results, the likelihood is increased that pupils will relate the graphical representation of relationships to the activity itself.

FOCUSING ATTENTION ON OVER-ARCHING ISSUES

The interactive nature of tools such as simulations, data analysis software and graphing technologies can be influential in allowing students to visualise processes more clearly. Computer analytic facilities are advantageous over manual methods in allowing a more holistic and qualitative approach to pupil
analysis of trends and relationships between variables in a graph rather than individual data points.

**FOSTERING SELF-REGULATED AND COLLABORATIVE LEARNING**

Students working with various tasks at the computer may work more independently of the teacher, and at their own pace. Digital learning environments can be designed so that students can work collaboratively.

**IMPROVING MOTIVATION AND ENGAGEMENT**

The idea that using ICT enhances student motivation has gained currency in recent years. Using various ICT applications can be challenging in contrast to ordinary school work, students are in control and can work at their own pace, and finally, some ICT tools may give rapid feedback.

**IMPLICATIONS OF ICT IN SCIENCE EDUCATION**

Information Communication Technology plays a major role in human activities in everyday living in order to cope and adopt to the demand of the environment. If the vision of science education is to bring socio-economic development, the role of ICT in science education cannot be over – emphasized. In the world over, it is generally agreed that development could only be meaningful if and when it is science and technology driven. With the actualization of the vision and prospects of ICT has the following implication on science education.

**Adequate funding:** The success of ICT in science education program largely depends on funding. This can be achieved when the funding of the program is properly articulated and handled especially as it is regards to science education.

**Provision of Instructional Materials:** Provision of Instructional Materials are materials, facilities, equipment that the teacher uses to illustrate explain and emphasizes the lesson for better comprehensive by the students.

**Monitoring and evaluation:** All tiers of government and educational management are involved. The target is to identify science education potential constraint so that appropriate step can be taken to overcome them.

**Teaching Methodology:** Method are means that teachers use to drive home their lesson presentation thereby making learning experience concrete to learners. Mbakwe (2005) in Eya et’al (2012) affirms that methodology of teaching is what makes a teacher a professional. The old method of teaching science which is teacher centered should be dropped by science education teachers.

**PROBLEM MILITATING AGAINST APPLICATION OF ICT IN SCIENCE EDUCATION**

As good as ICT might seem to be to any nation yet there are some problems militating against its application even in developed countries of the world.

**Inadequate funding** The money needed for full ICT compliance is huge and this fund is not available because of economic situation of the country. Equipment like computers, projectors and internet facility are required; these materials are very costly to purchase by any school except there is external aid.

**Teachers’ factors** Majority of science teachers are not computer literate and have remained in that condition for long time without seminar, conference, workshop and refresher course in computer. The best way to say this is that there is shortage of certificated computer teacher in our schools.

**CONCLUSION AND RECOMMENDATIONS**

Science education is not just going to school to study biology, chemistry or physics but study of these subjects in conjunction with education. ICT is good for effective teaching and learning in science education; ICT have many applications in science education that can facilitate learning of difficult concepts in biology, chemistry and physics. However, there are problems militating against the full
application of ICT in science education; based on this conclusion the following suggestions are recommended:

1. ICT centre should be established in all schools and fund be made available to purchase computers and other ICT equipment;
2. More trained computer teachers should be employed and those science teachers who are not computer literate should be mandated to go for computer training;
3. Government should make it mandatory for science and computer teachers to always; attend seminar, workshop, conference and refresher course in computer;
4. Government should provide more jobs for young unemployed graduates as a measure of security for the nation;
5. There should be a serious punishment for any individual or group who mismanaged or misappropriate money meant for education;
6. Government should provide all science teachers with laptop;
7. Government should work hard to solve problem of power failure in the country

REFERENCES
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