

An Innovative Information and Communication Technology (ICT) Based Approach to the Teaching and Learning of Chemistry

¹K.O. Oloruntegbe and ²M.O. Odutuyi

¹Faculty of Education, ²Department of Curriculum Studies and Educational Technology,
Adekunle Ajasin University, Akungba-Akoko, Nigeria

Abstract: The authors of this study after tracing student's poor performance in chemistry to inappropriate methodology of science delivery, proposed Information and Communication Technology (ICT) based approach. The approach may be costly, but it will go a long way to solve the problem of poor performance. The authors discussed the meaning of ICT areas of application in chemistry. Programming options, the benefits and what to provide to make the approach work. They then concluded by suggesting that Nigerians should move with the rest of the world by embracing recent and modern approaches to science teaching and learning.

Key words: Innovative information, communication technology, approach, teaching and learning chemistry

INTRODUCTION

Several authors reported the downward trend in the performance of Nigerian students in science (Adeyegbe, 1994; Nwosu, 1994; Oloruntegbe, 2000). Our daily newspapers are replete with such stories. Chemistry is not left out as it has also been revealed by Bello (1990). Oloruntegbe and Omoifo (2000) that not only are the results getting worse but also the recipients and getting progressively unscientific in their thought pattern and approach to solving problems.

Chemistry is generally referred to as the mother of all sciences. This is because the choice of courses and careers in science and applied science is determined by how well a student performs in chemistry at SSCE. A student who is deficient in chemistry. Although, may have good grades in other science subjects, will hardly be able to offer any course in the faculties of science, medicine and engineering in the university. It therefore, means that the low enrolment in the faculty of science and the inability to meet the stipulated 70: 30 science to art in our University is partly due to poor performance of students in chemistry at SSCE and in JAMB Examination.

Of all the factors that could be responsible for the situation described above, the teacher and his method of teaching often come under attack. Inappropriate methodology of science delivery (Oriaifo, 1997). The employment of indigenous and traditional methods (Ogunsola-Bamidele, 1998) and the absence of dedication and resourcefulness are often cited as teachers factors. This is why it has become necessary to try our hands on

something modern and effective. Information and communication-Based approach to chemistry teaching is suggested and discussed in this study.

MEANING OF ICT

Information and Communication Technology or simply Information Technology refers to the use of electronic equipment (especially computers) to process. Store and disseminate information to and over a wide audience (Sanni and Osungbemi, 2002). It is a convergence of various technologies ranging from electrical/electronic engineering, computer science/engineering and telecommunication etc. these have been merged into one single field that today has wide application in all facets of human endeavours medicine, engineering, education, commerce and finance to mention a few. Computers have been put to a wide use in aiding processes of information and instruction in all these areas.

ICT AND INSTRUCTION IN EDUCATION

There are 2 major areas of application of ICT in the teaching and learning processes in secondary schools. They are the Computer Assisted instruction (CA) and Computer Managed instruction (CM). Beside these, the use of internet electronic mail, tele-conferencing, web site hosting, topic searching and file transfer have provided access to information that covers a wide range of topic and interests in medicine, research, science and technology.

As means of facilitating teaching and learning processes in the schools, CAI is not just a means of transforming knowledge, but more importantly it can be an extension of both the teacher and the chalkboard. In this case topics covered in the syllabus or the curriculum are encoded in various computer programmes in a self-instructional mode which makes it easy for the students to use with minimal assistance.

ICT AND DIFFICULT CHEMISTRY CONCEPTS

The often perceived difficult and abstract concepts in chemistry such as radio-activity, mole and stoichiometry, electrochemistry, organic chemistry, etc. can be encoded or programmed and presented in an exciting and captivating inter-phase that is simply a beauty to behold. The benefits of instruction presented this way are numerous. These include:

- Making learning exciting and challenging.
- Allowing for quick responses and feed back.
- Allowing learners proceed at their own rate.
- Increasing motivation.
- Enabling student to gain both qualitative and quantitative understanding of problems of the topics under study.
- Simulating experiments.

The employment of these additional media can serve to supplement or/and complement the actual classroom and laboratory chemistry activities and information from books. The overall benefit is that the learning of chemistry concepts will be enhanced, retention and transfer of knowledge can be assured. It must be noted that many students perform poorly not because they are bereft of knowledge but because of inability to retain and transfer such knowledge in solving problem in more mobile situations. For example, mole concept finds application in several areas of quantitative chemistry like electrolysis, mass-volume relationship etc. to have both qualitative and quantitative understanding of such topics will aid transfer of learning.

CAI is applicable in the areas such as:

- Demonstration.
- Interactive teaching-tutorial aids.
- Games and simulation.
- Self-testing exercises (Sanmi and Osungbemi, 2002; Ekireghwo, 2001).

What makes it most interesting is the degree of interaction between the user and the machine as facilitated by colourful and man/machine inter-phase.

PROGRAMMING OPTIONS

There are two major options for device in ICT-based chemistry instruction. One is ready made off-the shelf packages and the other is the customized. Self-developed applications. The former means commercially available educational software which have been prepared with all possible user queries in mind. There are many such packages in compact discs around. The major limitation here is lack of flexibility as all possible queries have been envisaged and answers supplied. They do not give room for new questions and responses as they may arise from time to time.

The other option is to develop the software in line with the prevailing and immediate environment that make possible students' queries as obtained in day-to-day classroom interaction.

These could be developed in line with local classroom and home environments. The major problem here is a lack of competence. Software development, a major field of computer science, requires a versed knowledge of programming languages like C++, Java, Visual basics, etc. This knowledge is necessary to encode the desired topics properly into machine-readable forms. The development of tasks, exercises, games, drills, etc demands a good grasp of programming languages and techniques that are not cheap to come by.

In addition to electronic-learning. A web-based system with colourful hyper-links linking related topics to one another in a quick-reference manner, can be developed. This makes studying faster and wider in scope. By this, a learner studying in a particular software environment can quickly navigate other related reference materials either in libraries or private books collection. These have proved an advantage in educational researches.

ASSUMPTION

For successful and effective use of ICT-based mode of instruction, the authors take for granted the availability of the followings among others.

- Micro-computers, at least one system to 4 students, meaning that there will be 10 systems for a class of 40 students.
- Ventilated classroom accommodation and conducive sitting facilities.
- A regular supply of electric power to operate and maintain the system meaning that all science teachers must be computer literate.

Through the cost is a bit much, the gain is unquantifiable much too.

CONCLUSION

The authors are of the opinion that continual adherence to traditional methods of science delivery will continue to lower students' performance in science at all levels of cognitive skills and scientific attitudes. To solve this problem and also to catch up with the world trend, there is the need to embrace recent and modern techniques and approaches to doing things. It is good to remember that the whole world is going computer. The situation where science teachers have not gone near computer system, talk less of operating them is not good. Worse still, Nigerian schools don't even have these systems. The financial implication of this innovation is much, but like the submission of our past military governors somebody who is not ready to pay for or fund the education of his/her children should be ready to settle for ignorance. The bulk of the populace will actually remain actually remain ignorant except we start to pay serious attention to education.

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