Development of a Computer Package on Organic Chemistry for Colleges of Education Students in Nigeria

Roseline Akpokiere, Federal College of Education, Kontagora, Nigeria
Oloyede Solomon Oyelekan, University of Ilorin, Ilorin, Nigeria
https://orcid.org/0000-0002-4193-1640
Adekunle Solomon Olorundare, University of Ilorin, Ilorin, Nigeria

ABSTRACT
The low achievement of chemistry students in Nigerian Colleges of Education has been attributed to a number of factors including a lack of indigenous computer software for enhancing course teaching. This study therefore sought to develop and validate an instructional computer package on organic chemistry for Colleges of Education in Nigeria. The development of the package involved the use of Macromedia Flash and Macromedia Time Line and Frames on HTML platform. CorelDraw and Microsoft Word programs were used for texts and graphics, Macromedia Fireworks was used for some texts, buttons, and graphics, while Macromedia Flash was utilised for animations. In the end, an organic chemistry computer instructional package (OCIP) has been produced and validated. It is recommended among others that lecturers teaching organic chemistry to first year College of Education students should make use of the developed package to improve the understanding of the course by the students.

KEYWORDS
Chemistry Instruction, Chemistry Lecturers, Chemistry Students, Constructivism, Educational Technology, E-learning, ICT, Validation

INTRODUCTION
Advancement in science and technology is a major index for gauging development the world over. Chemistry is one of the basic science subjects taught in schools, colleges and universities. It provides the basic knowledge of principles which when applied, have the propensity to contribute significantly to the quality of life in the contemporary technologically driven society, and as such, it stands in a central position among the sciences (Abdullahi, 1982; Jegede, 2008). Despite the contributions of chemistry to national development, the subject continues to remain one of the most difficult in the school curriculum (Oyelekan, 2006).

Findings from researches conducted at both secondary school and Colleges of Education levels revealed that organic chemistry concepts were perceived by both students and teachers to be abstract, misconceived and difficult to comprehend (Musa, 2004; Oyelekan, 2006; Musa, 2010; Onijamowo, 2010). Students’ poor performance in the West African Senior School Certificate examination (WASSCE) chemistry lays credence to the difficulties still experienced by them in the subject at the
College of Education level. Poor foundation in school certificate chemistry is no doubt a determinant factor of the students’ subsequent performance at higher levels of education. The relative performance of students in the West African Senior School Certificate Examination (WASSCE) (2007-2016) is shown in Figure 1 below.

A critical analysis of the students’ performances as shown in the figure shows fluctuations during the years under review. More worrisome is the downward trend from 2013 to 2016.

Findings from the studies of Musa (2004; 2010) revealed that Chemistry students had significant learning difficulties in the Colleges of Education. This has been a source of concern to science educators over the years. Reasons advanced for this include students’ poor performance in chemistry: students’ poor study habits, poor learning environment, inadequate number of professionally trained chemistry teachers, lack of well-equipped laboratories, inadequacy of relevant instructional materials and non-availability of computer-based instructional packages for teaching the subject.

In addition, the 2006 National Commission for Colleges of Education (NCCE) report on accreditation attributed College of Education students’ declining performance in chemistry to lack of appropriate materials/apparatus for effective teaching of the subject as well as poor conceptualization of the subject matter.

The potentials of Information and Communication Technology (ICT) in facilitating students’ learning and improve teaching has been established in literature (Kazu & Yovulzalp, 2008; Oyelekan & Olorundare, 2009; Yusuf & Balogun, 2011). Integration of ICT in tertiary education has become increasingly important to adequately prepare students for the world of work. The teaching and learning of chemistry at the College of Education level should be such as to produce highly qualified middle-level manpower knowledgeable in the processes of chemistry and capable of impacting these to the students (National Commission for Colleges of Education NCCE, 2012).

Organic chemistry accounts for a sizeable proportion of about 23% of the chemistry curriculum content at the Nigeria Certificate in Education (NCE) level (NCCE, 2008). NCE is the certificate awarded by the Colleges of Education. The difficulties experienced by students in learning organic chemistry cut across understanding of chemistry concepts, students’ misconceptions or conceptions in chemistry among others as revealed by various studies (Musa, 2004; 2006; Musa, 2010; Voska & Heikkinen, 2010; Onijamowo, 2010; Obomanu & Onooha, 2012).

Attempts have been made by science educators and researchers in chemistry education to identify difficult topics and concepts in chemistry and to also provide innovative pedagogical strategies for enhancing chemistry education (Alebiosu, 1998; Ayodele, 2011; Musa, 2010, Opobiyi, 1996,

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