E-LEARNING AND TEACHER PREPARATION IN SCIENCE AND MATHEMATICS: THE PARADIGM FOR UTILIZATION OF INTERACTIVE PACKAGES

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Abstract

The issue of utilization of e-learning packages in the teaching and learning of science and mathematics is examined in this paper, in the light of the efficacy of commercially available e-learning and teacher made packages and their limitations. The paradigm for the use of interactive e-learning packages and the curricula subject matter for teacher preparation that will yield an enduring, effective and rewarding e-learning application in educational system is also proffer.

Keywords: E - Learning, Teacher - Preparation, Paradigm, Utilization, Interactive, Packages

Introduction

The teaching of mathematics to obtained the desired objective has always been a contentious issue in education. The situation is so lamentable that Wetzel(2009) blame it on the wrong approach to teaching used by mathematics teachers. The bane is that the teachers might not have been well groomed and grounded to be able to handle the job with the required dexterity. This prompt the need to incorporate e-learning programme into mathematics teachers preparation. The main question is 'what is e-learning?'.

The concept e-learning simply means electronic learning. It is multifaceted. It embrace all form of electronic devices that are employed in teaching and learning situation to make learning easy. Example of the devices includes computer and other audio-visual facilities. The most popularly used e-learning device is the computer. Computer can be used

in teaching and learning in CAL and CAI. CAL imply Computer Assisted Learning while CAI Mean Computer Assisted Instruction.

The CAL and CAI are of different types and covers different subjects and topics. There are the commercial available packages which are produced by expert in computer programming, which are made to cover wide range of subjects at the different level of education. Another form of CAL and CAI which are used in teaching and learning is the teacher-made packages or improvised instructional packages. Both the commercially available packages and improvised instructional are good and useful in teaching and learning mathematics and Science subjects but the effectiveness, adaptability, malleability and versatility depends on how well the teacher has been prepared to handle it.

For CAL and CAI packages that are available in the market teacher require certain skill to be able to use them. Even the learners they need to be inculcated the prerequisite entry behavior that can enable them handle or be taught with CAL and CAI. Huffaker(2003) lamented the lack of proper integration of e-learning into the classroom situation in the traditional conventional learning scenarios advocating for the need to tap all the advantages of e-learning by entrenching into the school system as part of the curricular practice. Hassana and Woodcock (2010) critically examined the uses of e-learning in U.K and Saudi Arabia and discovered some similarities and differences which are culture oriented. They pinpoint that lack of proper staff development and teacher preparation as some of the factors that hinders effective use of e-learning educational system in Saudi Arabia.

E-learning has defined in varieties of ways by different persons. Stockley (2006) defined e-learning as the delivery of learning, training or educational programmes via electronic means using computer or other electronic devices to provide training, educational or learning materials. He mentioned that it can be by the use of internet or intranet, CD-ROM or DVD to provide learning materials. Wikipedia(2010) further elaborated on e-learning as all forms of electronically supported learning and teaching using information and communication system which may or may not be networked, comprising of computer and network-enabled transfer of skills and knowledge, which may be web-based, computer-based, virtual classroom and digital collaboration, delivered through internet, intranet/extranet, audio or video tapes, satellite TV, and CD-ROM, which can be self-paced or teacher-led embedded with media text, images, animation, streaming video and audio and associated with acronym such as CBT(computer-based training), IBT(internet based training) and WBT(web-based training).

The use of e-learning in pedagogical spheres date back to 1993 when Graziadei(1993) demonstrated online computer-delivered lecture, tutorials and assessment project using, VAX notes conferencing and assorted software which allowed teaching and learning to take place in a virtual setting. It is from here the development of e-learning grew to other levels, including diverse use of e-learning in the teaching and learning of sciences and mathematics.

Use of E-Learning in the Teaching and Learning of Sciences and Mathematics

The use of e-learning in science and mathematics classes very essential. It will not only help to make the teaching and learning of science and mathematics to share in educational revolution (Liverpool, Ndam and Oti, 2010) which e-learning brings into educational system but also to tap the benefits of a more effective method of teaching and learning offers (Yaakub & Finch,2010). The efficacy of e-learning in science and mathematics education was questioned by Borba and Bartolini(2010) and replied stating that e-learning may not be different from other technological innovative strides that have been present in science and mathematics education for long but failed to produce significant impact in the teaching and learning of the subjects. If close scrutiny is carried out (Kidwell, Ackerberg & Robert, 2008) it would be discovered that much is still needed to be done to ensure that advantage of e-learning technology is optimally exploited.

There is also the question of how effective e-learning has solve the problem learning mathematics. Dhariwal(2010)comparatively x-ray the traditional method and e-learning approach to teaching mathematics and science subjects and averred that e-learning make room for individualized learning whereby learners progress at their own pace which is absent in traditional method of instruction. The e-learning method obviously personalize the instruction, avail the gist and gem of various learning styles of each learner, boost the confident level of learners, brings about constructive modification in the roles of teachers and learners as wells fosters desirable student teacher relationship(Dhariwal, 2010).

Kajetanowtcz & Wierzejewski (2010) pinpointed that e-learning has no rival when it comes to generation of intrinsic motivation and initiation of organized active learning in mathematics and science education. They equally see e-learning as an efficient means of promoting self-study cum frequent testing in the form of formative evaluation which engender proper monitoring of educational progress and periodical achievement. Overall research report shows that e-learning provide positive effect on learners achievement in mathematics.

Content of E-Learning Material for Science and Mathematics Teacher Preparation

The major handicap for the use of e-learning in science and mathematics education is lack of knowledge of Information and Communication Technology(ICT). Hassana & Woodcock(2010) found out that one of the commonest weakness of effective e-learning practice in schools is teacher lack of knowledge of ICT. In comparative study of schools in U.K. and Saudi Arabia, the discover that teachers who have little or no knowledge of ICT find it difficult to use the e-learning packages and not to talk of producing one. Based on this the following are suggested as the content of e-learning material for science and mathematics teacher preparation.

Table1: E-learning Material for Science and Mathematics Teacher Preparation

S/N	Topic	Content Materials	Mode Implementation
1.	Computer Appreciation	Introduction to computer studies, computer operation, word processing, preparation of presentation packages (power point presentation)	Theory and Practical
2.	Presentations	Introduction to multimedia presentations, preparation of slides, presentation word processing packages, formatting of presentation packages, validation of presentation packages.	Theory and Practical
3.	Computer programming	Introduction to programming languages, BASIC, Logo, C^{+}, C^{++}, Java, etc. Preparation simple instructional packages in any chosen programming Language,	Theory and Practical
4.	Administration of e-learning packages	Implementation of commercially available packages, validation and evaluation of commercially available packages, production teacher-centered packages, validation and evaluation of teacher-centered packages	Theory and Practical

The above table presents a prototype of the content of e-learning materials for science and mathematics teacher preparation which can be enriched and used during the duration of

study in the teacher preparation programme. The various institutions that are involved in teacher preparation programme can adopt the above content and modify to suite their curricula and use it for teacher education programme of study. An enrichment op the above curricula content materials will essentially enhance sound teacher education product. The issue inadequate knowledge of ICT which hampers utilization of e-learning in the teaching of science and mathematics could be taken care of through proper implementation of the e-learning content material of the teacher preparation curriculum.

Appraisal of Commercially Available and Teacher Made Interactive Packages

The two types of interactive packages in use are the commercially available and the teacher-made interactive package. The commercially available interactive packages are produced by persons who are not practicing teachers and end users of the products and do not take learners needs into consideration. Sood & Jitendra (2007), stated research finding has proved that commercially available packages focus on instructional designs while it takes no cognizance of teachers professional knowledge and experiences. Hassana & Woodcock (2010) equally complained that the absent of end users in the designing of commercially available packages is the reason for the packages not being able to meet the teachers and learners need.

It is also of note to mention that one of the disadvantages of commercially available packages is lack of consistency with the curricula. Hassana & Woodcock(2010) equally complained that the absent of end users in the designing of commercially available packages is the reason for the packages not being able to meet the teachers and learners need. This clearly, shows commercially available packages are not ideal for teaching and learning purposes unless they are modified to suit learners need by the end users.

Obviously, there no gainsaying that teacher- made package are the ultimate for teaching and learning of science but they should possess the following qualities:

a) Adaptability to learners need
b) Be motivational
c) Must curricula and learners centered
d) Should versatile, flexible and malleable
e) Should be very valid and reliable
f) Should satisfy curricula and lesson objectives and
g) Do not undermine the philosophy of Science and Mathematics education.

Conclusion

It is obvious that e-learning will provide a means of resolving learning difficulties in science and mathematics, but it should be designed to cater for learners need and satisfy curriculum objectives. The commercially available packages notwithstanding that they not provide for all the essential elements of good instruction, it clear that they can serve as model for teachers to adopt in production of their own learners centered packages. The teacher made packages should qualitative enough to suit into diverse learning needs and situation and possess acceptable life span.

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