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E-Learning and Teacher Preparation in Science and Mathematics

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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 more and more use of interactive e-learning packages and the curricula subject matter for teacher preparation that will yield an, effective and rewarding e-learning application in educational system is very obvious.

***Keywords*—** E-Learning; teacher-preparation; mobile; packages.

I. INTRODUCTION

The teaching of Mathematics is always a very talked about subject. From beginning itself it is thought that Mathematics is very difficult subject. It is actually not. It is an abstract subject at higher level. Upto standard XII it is all formula based but after that total scenario changes. This is where students and in particular teachers must take care. If Mathematics is not properly taught from the beginning to Under Graduate students then they find the things very difficult to digest. Most of the times Mathematics teachers teach in wrong way. Importance is given to what will be asked in examinations instead of making basics of the subject clear. This prompts the need to incorporate e-learning programme into Mathematics teachers preparation. By use of E-learning facilities available the teaching and learning in Mathematics can be made more and more interesting.

The main question is 'what is e-learning?'. The concept e-learning simply means electronic learning. It is multifaceted. It embraces all forms of electronic devices that are employed in teaching and learning situation to make learning easy. Examples of the devices includes computer and other audio-visual facilities. The most popularly used e-learning device is the computer. Use of Mobiles is increasing day by day. Now a day each student and teacher has smart phone in general. This device also can be used as E-learning and can be treated as M-learning. Use of E learning in India is increasing day by day. Teachers must make deliberate effort in that direction.

E-learning has been 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 educational 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.

II. USE OF E-LEARNING IN THE TEACHING AND LEARNING OF SCIENCES AND MATHEMATICS

The use of e-learning in Science and Mathematics classes is 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 solved the problem learning Mathematics. Dhariwal (2010) comparatively x-rayed the traditional method and e-learning approach to teaching Mathematics and science subjects and claimed that e-learning makes room for individualized learning whereby learners progress at their own pace which is

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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 confidence level of learners, brings about constructive modification in the roles of teachers and learners as well as 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.

The major handicap for the use of e-learning in Science and Mathematics education is lack of knowledge of Information and Communication Technology (ICT) in teachers. 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. If the school teachers have little or no knowledge of ICT then they find it difficult to use the e-learning packages and not to talk of producing one. Based on this the following are suggested as means for developing teachers for E-learning teaching.

1. Teachers should change their mind set up and get adopted to use of ICT in teaching learning process at its optimal.
2. Teachers must be made aware of basics of ICT. (It will include Introduction of Computers, various operations on computers, Word Processing, Preparation of Presentations.)
3. Downloading material from Net, Searching material from various web sites.
4. Knowledge of Education related websites and their use.
5. Preparation of Video lectures, uploading and downloading.
6. Use of Smart phones and various available educational apps.
7. Little knowledge of Computer Programming wherein C, C++ etc are known.

The courses like B.Ed. and M.Ed. must include E-learning and things related to that in the syllabus itself so that the students who want to develop their career as a teacher will have this dimension right from the beginning of his/her career. Group of teachers can be created who have proven track record as best teacher in a particular Science subject. Lectures of these teachers can be recorded and uploaded on Net and made available to all the students in the given area. Also these experts can be made available for discussion for selected time and students can get benefits.

III. 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 need into consideration. So the packages developed by these people are not proper for students and teachers also. Sood & Jitendra (2007), stated research finding has proved that commercially available packages focus on instructional designs while it takes no cognizance of teacher's 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 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.

IV. M-Learning

Mobiles can be effectively used in teaching and learning process. It is most popular device and used by teachers and students. The video lectures can be downloaded on mobile and can be seen at any time. It is found that students use camera to take snaps of notes, assignments instead of writing. Lots of sites are there which make E-books available and these E-books can be read by students by use of adobe reader. Students and teachers can exchange messages, notes, personal views via mobiles. There are lots of Science and Mathematics related apps available on google play store and these apps can be used very effectively in the process of teaching and learning.

Teachers can develop their own apps which will take care of continuous evaluation of students. These apps can include 1) MCQ Tests 2) One line answer tests etc. The apps can be developed in such a way that evaluation will be attractive.

Teachers should promote students to use Mobile to play video games and/or puzzles like Mine sweeper, brain games, mind games or create their own apps which will surely help students to develop their thinking ability, memory management.

Teachers and students can create Whatsapp group and virtual discussions can be conducted about the difficulties of the students about the topics taught in the class. This will help the students who are hesitant to ask their queries in the class. Also teacher can post peripheral stories about the topic on the blog or discussion group which will help to boost student's interest in the subject.

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In the modern education system, student is at center and we can appreciate, point out the errors or misbehaves of the students by sending a timely message to them.

Wishing 'Good Morning' to every student by creating a group on Whatsapp can be the best idea. Teacher can send a question related to curriculum along with this message. This can be a modern way to give a home work.

In short sky is the limit to use Mobiles as a E-learning device. Developing various ideas of using Mobiles in E-learning is itself a topic of research.

V. 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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