

A study on the effectiveness of virtual lab in E-learning

Lavanya Rajendran, Ramachandran Veilumuthu, Divya. J¹

Abstract— The research aims to identify the effectiveness of virtual lab in E-learning suite. The study aims to analyze the increase in learning skills and the understanding level of concepts by implementing virtual lab among school students in Chennai. The study also focuses on identifying whether the virtual lab helps the students to increase the self-paced learning. The research methods adopted are Survey and Expert Interview. The findings of the study shows that majority of the students are aware of the virtual labs and are highly appreciated by them. Students prefer computer assisted tools than the textbooks for learning purpose. The study suggests that the virtual labs have to be adopted in schools for making their students think out of the box.

Index Terms— e-Learning, Virtual Labs, Simulations.

I. INTRODUCTION

Education is defined as the conscious attempt to promote learning in others. Traditionally, analysis of this attempt has centered around direct teaching on the part of teachers. In what constitutes a paradigm shift, however, people now note that learning can be promoted in ways that go beyond direct instruction by a teacher-education now centers around creating a viable, productive learning environment, regardless of how teacher-centric that environment might be. When the term education is combined with entertainment, the term edutainment is coined. Edutainment also called "e-learning" are new methods and practices that enabled learning in faster, more efficient and more entertaining ways. The idea is usually to combine games with learning, using software or interactive courses.

Learning induces a persistent, measurable, and specified behavioral change in the learner to formulate a new mental construct or revise a prior mental construct. The learning styles can be basically classified into four methods:

- Auditory learning – learning by hearing
- Visual learning – learning by seeing
- Reading / writing – learning by processing contents.
- Kinesthetic learning or practical – learning by

experimenting things.

Traditionally in India mostly Auditory learning style are used, that is students just learn what their teacher has told or what they heard. In this style of the students knowledge mostly depends on the oratorical skills and knowledge level of the teacher. In depth knowledge on the subject will be lacking among the students due to distraction and many other issues.

Visual learning is used in forms of powerpoint presentations, charts or blackboard illustrations. This type of teaching made the students to know how the system will look like. The problem here is, even though they were able to visualise the system, the students were ignorant about how the actual system works. They are restricted with the words of their teacher and the words from the textbook.

In the next stage education was through Visuals combined with Auditory. In this context, visuals means not only pictures but also 3D and 2D videos. Multimedia representation of the classroom lessons was available to students. This mode of teaching through Computers is known as Computer Based Training abbreviated as CBT. Through CBT a student will come to know how a system will look alike and how it works. CBT raised the level of education but again it also had a negative side to it. Now a student can know how a system works but the student was not able to experiment with the system. Due of this reason, students lacked in cognitive knowledge.

The fourth learning style is the kinesthetic learning. This means learning by doing. This learning style helps the students to develop logical reasoning. Some simple experiments can be done as laboratory exercises but when there are few complex experiments which cannot be done in labs. In such conditions virtual labs comes to the rescue.

Virtual Labs have considerable educational potential because they provide an opportunity to 'learn by doing'. They also provide access to systems which are otherwise

¹ Lavanya Rajendran is with the Department of Media Sciences, Anna University, Chennai, India. (Ph: +91-98400-09744, lavi_82@yahoo.com).

Ramachandran Veilumuthu is with the Department of Information Science and Technology, Anna University, Chennai, India (rama@annauniv.edu).

Divya. J, was a student of Masters Degree in Electronic Media, Department of Media Sciences, Anna University.

inaccessible for reasons such as safety, cost and size. Users can explore a variety of what if scenarios by changing the input and observing the effect on the output.

Thus, the virtual labs have lots of advantages. The study aims to identify the effectiveness of these virtual labs in E-learning suite. The study aims to analyze the increase in learning skills and the understanding level of concepts by implementing virtual lab among school students in Chennai. The study also focuses on identifying whether the virtual lab helps the students to increase the self-paced learning.

ask to obtain the required information. Structured interviews are easy to tabulate and analyze, but they do not achieve the depth or expanse of unstructured interviews. Conversely, the unstructured type elicits more detail but takes a great deal of time to score and analyze.

In the study, unstructured interview was adopted with an expert, Mr.Suresh Kumar, CEO, Cyber School Technology Solutions, Adyar, Chennai. He has got an extensive experience in multimedia production especially in producing CBTs with Virtual labs embedded in it. And Mr. Jeyachandran, MCA, CCNA Senior System Executive and Faculty, NIIT Technologies, Chennai.

II. RESEARCH METHODS

The research methods for the study are survey and experts interview. Survey research is one of the most important areas of measurement in applied social research. The broad area of survey research encompasses any measurement procedures that involve asking questions of respondents. A survey can be anything from a short paper-and-pencil feedback form to an intensive one-on-one in-depth interview.

In the study, the samples are the students studying in eleventh standard. The questionnaire method will be used for collecting the data from the samples. The Sample size of the study is fifty students of age group 16 to 17 years. The samples were taken from the XI class in a school in Chennai that have exposed the student with computer based tutorials. Out of 50 students in a class, 35 were boys and remaining were girls, who will be the samples of the study.

Interviews are designed to explore someone's point of view in detail. The key thing that distinguishes the interview from questionnaire is the researcher's flexibility to explore interesting things. Qualitative interviews begin with interview schedule that lists the most important topics to be covered. It is the most flexible means of obtaining information because the face-to-face situation lends itself easily to questioning in greater depth and detail.

There are two basic types of interviews namely structured and unstructured. In a structured interview, standardized questions are asked in a predetermined order, relatively little freedom is given to interviewers. In an unstructured interview, broad questions are asked that allow interviewers freedom to determine what further questions to

III. RESEARCH ANALYSIS

The study shows that the 35 percent of the students surf internet for games and only 25 percent of them surf for improving their knowledge. The remaining 40 percent of samples use internet for both education and entertainment.

All the 92 percent of the students who are aware of virtual labs are interested in doing experiments virtually. They feel they need not worry about the damaged caused due to wrong results and they can work in lab as and when wanted. There will not be any restriction in the lab timings.

Almost 90 percent of the students recommend using computer based tutorial with virtual labs incorporated with them instead of textbooks. Nearly 62 percent of them feel they require a faculty for guidance all the time and 22 percent of them felt they don't require any guidance, whereas 16 percent of the students felt they require guidance for certain topics.

All the samples responded that they would use the cbts with virtual labs in it in future for the subject available. This shows the students enthusiasm in using the virtual labs. They felt by using these virtual labs, they are learning through fun.

According to Mr.Suresh Kumar the animations (visuals) have a huge impact in the minds of the students, even though they might not recognize the technology behind it. He continued stating that virtual labs are very interactive component which flourishes the student mind about the concept. He commented that the future generations would be using computer based tutorials with virtual labs embedded in it and the percentage of book reading pupil will be negligible. He strongly says that multimedia products will take over all other media.

The expert personally felt that without virtual lab a CBT/WBT can never achieve such amazing quality. Virtual Lab are developed using commercial products like Macromedia Flash, Alias Maya, Discreet 3Ds max, Adobe Photoshop, Discreet Combustion. Many of the foreign companies have their own proprietary softwares and tools for the production of CBT/WBT.

He suggested that many youngsters in multimedia should help the schools and college to prepare the virtual labs, so that the entire curriculum are reproduced in this format without any manipulation.

These multimedia products not only help the

students to improve their knowledge, but also it helps the teachers to explain concepts easily. He said quality is the talk of the day. The future would be wholly digital and computer based, and text books would fade out and digital would creep in and encroach the present day of education stream.

The expert concluded by stating that the cost spent is worth it and this technology would survive and thrive in the industry. These virtual labs will help the students at remote areas. They can learn the concepts independently, thereby increasing their performance and efficiency in the area of their interest. It will be cost effective for the students. They can do the experiments even at home or schools, or ever where they want. The major problem in rural areas is lack of facility to provide laboratory for the students can be minimized by using these virtual labs.

Mr. Jeyachandran says, "When teaching networking, it is impossible to set up the full infrastructure in a learning center. It will highly expensive to set up the full equipments. So the only rescue to these kinds of problems is Virtual labs.

NIIT has facilities of Virtual Lab and Simulation softwares available for teaching networking. The main advantage of students using these softwares is that students can experiment with the network architecture without any difficulty and without any fear of wrongly connecting the equipments.

Another great advantage of using Virtual labs and simulation softwares is that students can work in their home. And moreover in the field of networking most of the subjects were covered theoretically till now but now students have the advantage of working it out how the real networking setup looks like.

IV. RESEARCH FINDINGS

The concept of Virtual Lab is known to majority of the students and they are very much appreciated by the students and the faculty. All the multimedia components like visuals, graphics, images, animation, sounds plays an equally important role in these multimedia components.

Virtual lab is an interactive product that assists students to perform their experiments in step by step procedure, by giving proper instructions and extending its limitations. Virtual lab encloses infotainment, edutainment and enrichment. No pre-requisites are essential, and a very basic knowledge of accessing computer is widely enough to use CBT with Virtual Lab.

V. SUGGESTIONS

The Suggestions were listed below:

- Major Companies and NGO can sponsor for the production of CBT and WBTs with Virtual Lab as the cost of preparing these are very high.
- The Government can help distributing the cbts with virtual labs free of cost to rural schools.

- Multimedia Production companies instead of producing only computer based tutorials can embed virtual labs in it where ever possible.

VI. CONCLUSION

Computers and the Internet have expanded the way in which information can be delivered to the students of today. Today's technology provides a valuable opportunity to practice new learning techniques. Teachers should be made to use Virtual labs to facilitate learning. Teachers must adapt current teaching methods to incorporate this new media into the classroom as it has proved to be effective.

Computers have made a fundamental impact in most industries, providing a competitive advantage that has come to be essential to many businesses. Therefore, schools and colleges in India must also use Virtual labs to improve the educational standards

The Virtual Labs will be more than a "living" textbook. The "classroom of the future" will probably contain several kinds of simulators, virtual labs in addition to textual and visual learning tools.

REFERENCES

- [1] Chandola R.P, „The real problems of Indian Education „- Book Enclave, Jaipur, India, 2003.
- [2] E-Learning Case Study, "http://www.newman.ac.uk/Students_Websites/~m.m.friel/advcs.htm", Updated on 17 June 2004.
- [3] Fripp, John, „Learning Through Simulations: A Guide to the Design and Use of Simulations in Business and Education□, McGraw-Hill, 1993.
- [4] Benslimane, Djamel; Schahram Dustdar, and Amit Sheth, "Services Mashups: The New Generation of Web Applications" (HTML). IEEE Internet Computing, vol. 12, No. 5, 2008.
- [5] D. N. Sujatha, K. Girish, K. R Venugopal, and L. M. Patnaik, "An Integrated Quality-of-Service Model for." IAENG International Journal of Computer Science vol. 34 no. 1, 2007.

Lavanya Rajendran received her Bachelor's degree in Computer Applications. She completed her M.Sc. in Electronic Media and Informatics.

She is currently pursuing her research in College of Engineering, Anna University, Chennai. Her areas of interest include Cloud Computing, Computer Networks, Web Designing and Video Production.

Ramachandran Veilumuthu received his Masters degree and Ph.D. in Electrical Engineering from College of Engineering, Anna University, Chennai, India.

He is currently working as a Professor in the Department of Information Science and Technology, College of Engineering, Anna University, Chennai. His research interest includes Cloud Computing, Network Security, Soft Computing and Web Technology