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3 D LAB IN BIOLOGY: ENHANCES THE PROCESS OF TEACHING AND LEARNING

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Abstract:-The era of technology has wide impact on all the fields and changed the whole world in terms of interaction between human beings, understanding of abstract things. 3D Lab is one of the boons for the learners and teachers from the technology era. The articles discusses the importance of 3D Labs in teaching biology, creating 3d virtual learning environment in teaching learning process, knowledge about 3d animation software, benefits of 3d virtual environment in an educational setting and disadvantages of 3d virtual environment. 3D Lab improves their learning outcomes. It can bridge the gap between theory and practical experience, between the concrete world of nature and the abstract world of concepts and models. 3D- bio lab project aims to contribute to the improved understanding and impact of computer simulations on the efficiency of teaching and learning biology.

Keywords: Biology ,3 D Lab , Teaching And Learning.

INTRODUCTION:

The term e-learning can be applied to all those forms of teaching and learning based on the use of information and communication technology (Clark & Mayer, 2003). Computer-Based Training, Web-Based Training, online learning, distance learning, tele-tutoring, distributed learning – these are just a few examples from a broad variety of e-learning offerings. E-learning is often used as a generic term for all such forms of learning (Reinmann-Rothmeier, 2002).

Today, e-learning has become immensely popular at many national and international educational facilities and is turning into a common method of teaching. It is present at different levels of education, from schools to universities and vocational training. As technology is quickly improving, a growing number of e-learning concepts are finding their way into the education system. Compared to traditional forms of learning, e-learning offers numerous advantages: increased flexibility during the learning process, self-organized learning, different formats and ways of coding, and virtual communication. (Allen & Seaman, 2003; Gallenstein, 2001; Sauter, Sauter & Bender, 2002).

Technical teaching often requires the use of expensive laboratory materials which are frequently beyond the reach of many students. Students are also required to go to laboratories, which offer the appropriate facilities, according to a strict timetable. For these reasons, the need for alternative methods arises for teaching such as virtual laboratories via the Internet. In this article we present a virtual laboratory that is being applied to robotics teaching which allows the simulation and tele-operation of a robotic arm.

The “3 D LAB support systems for biology teaching/learning” (following 3dbiolab) aims to contribute to the improved understanding and evidence base of the benefits and impact of computer simulations on the efficiency of learning/teaching biology and other science subjects, provide teachers and principals a tool necessary for the efficient implementation of computer based simulations and e-portal in their teaching process and consequently foster the uptake of these simulations in their teaching practices and raise the effectiveness and attractiveness of biology teaching. The latter can also stimulate scientific curiosity and interest in young minds and encourage more young people to pursue a life in science to fulfill the growing shortage of research talent in Europe. More specifically, by analysing the various existing projects and good practices of using computer simulations in teaching science subjects within and outside the EU, developing a new model for successful implementation of e-learning courses and 2D and 3D computer simulations in teaching/learning biology on all educational levels and developing new innovative and quality 2D and 3D simulations for biology teaching and learning and testing and evaluating their impact on the learning outcomes of pupils and students.

Changing roles of Teachers and the Classroom Environment with the advent of e-learning.

Teachers do not necessarily mind change, what they do mind is being made to change and become e-teachers in the new e-education environment.

Many words have been written about the Internet and the possibilities for its use in e-education but little has been researched about how teachers effectively modify their practice to work in this new environment. Just because teachers in schools have teacher education qualifications, this does not essentially prepare them to be e-teachers. Support for e-teachers is often difficult to get when the supporters have not had any direct and practical e-teaching or e-learning experience themselves. Being able to teach confidently in one environment is not a pioneer to success as an e-teacher in a very different environment (Campbell, 1997). The fears and anxieties discussed earlier in this paper tend to overcome some teachers who may temporarily lose sight of the fact that teaching and e-teaching do have many commonalities.

The e-teacher who is surrounded by quickly changing e-environments and technologies must at times feel like they are trying to change a tire on a moving vehicle. When explaining the challenge and changing roles for e-teachers, it is a little like encouraging them to be information and environment architects. The environment they create may well be totally aligned with the work of the regular classroom so that e-learning becomes a vital part of it. Alternatively it may be a virtual classroom where the students only visit electronically. This seamless transition from what we now accept as learning to an e-learning environment will in time mean that the "e" ceases to have any meticulous significance. Different types of laboratories are available in e-learning platform which could be used for teaching science subject effectively.

Virtual laboratories: Laboratories that use software to replicate experiments (Schafer, Scott, Molina, Al-Kalaani, Murphy, Johnson, & Goeser, 2008). These labs utilize an interactive framework comprised of a dynamical model and basic tools that enable studying performance features while saving simulation development time (Costa-Castello, Olm, Vargas, & Ramos, 2012).

Remote laboratories: Laboratories that involve experimenting with actual devices, physically sited remote from the user, using Internet and local networks (Costa- Castello, Olm, Vargas, & Ramos, 2012). A remote laboratory allows students to carry out physical experiments through controlling the lab equipment from a distant location. Students in a remote laboratory can control experiments utilizing a web server and access to an interface (Schafer et al., 2008).

Distance/Internet/e-labs: Laboratories that control laboratory equipment at a physical lab from a remote, distant location while specifying parameters and retrieving results through live webcast via Internet. High speed Internet makes data and parameters accessible to the instruments at a remote site (Wu, 2011).

3D VIRTUAL LEARNING ENVIRONMENT

Virtual Reality and Virtual Learning Environment have become increasingly ambiguous terms in recent years. For example, Moore (1995) states that “Virtual reality falls into three major categories: text-based, desktop and sensory-immersive virtual reality”. The term Virtual Learning Environment has begun to be used to encompass any Internet or Web based learning resource with associated discussion tools. The term 3D environment has been chosen to focus on a particular type of virtual environment that makes use of a 3D model.

Specifically, the main characteristics of a 3D environment are as follows:

The environment is modelled using 3D vector geometry, meaning that objects are represented using x, y and z coordinates describing their shape and position in 3D space.
The user's view of the environment is rendered dynamically according to their current position in 3D space.
The user has the ability to move freely through the environment and their view is updated as they move.
At least some of the objects within the environment respond to user action, for example doors might open when approached and information may be displayed when an object is clicked on.

3D ANIMATION SOFTWARE

The main software tool that is used to create 3D animations is a package that can model, render, and animate 3D scenes. Several different packages are available to do this for all the major operating systems. Below is a short list of the most popular and capable 3D modeling, rendering, and animation packages:

Maya: Used extensively to create both movies and games, Maya is especially good at modelling and animating organic-based objects.
3ds max: Perhaps the most-popular modelling, rendering, and animation package for games, 3ds max includes a host of features for animating characters.
Soft Image XSI: As part of the Avid line-up, Softimage XSI includes an amazing collection of additional tools in its base package.

Light wave: Used in many television series, Light wave consists of two separate interfaces for modeling and animating.

BENEFITS OF 3D VIRTUAL ENVIRONMENT IN AN EDUCATIONAL SETTING

Using virtual reality in schools and colleges greatly eases the burden for teachers. Teachers become learning facilitators as students explore and learn in virtual reality. As opposed to merely supplying answers, teachers guide students' self-discovery and assist in building ideas. Virtual reality is a giant step towards "perfect learning" - a learning environment that focuses on the student rather than placing burdens on teachers. It creates a learning environment where students explore, discover and make decisions, while teachers assist and guide. From a teacher's perspective, virtual reality creates a structured environment that focuses students on specific learning objectives, similar to good teaching. Because the students are immersed in the virtual reality learning environment with a headset, there are no distractions to learning. Students are totally focused with no unruly behavior.

In addition, 3D animation is appealing and students enjoy in using it (Elliott, 2002) and it encourages students to interact with the content which makes students active in the learning environment. Tied to the curriculum, virtual reality is an educational aid without peer. It can be integrated into schools/colleges in a number of ways. Modularly designed programs work as a standalone educational tool, as a classroom supplement or as a study aid. In an initial stage of integration, as with the science subjects, virtual reality is best used as a supplement to existing coursework, allowing instructors to integrate the programs into learning objectives. For example in the biology class where students are learning cell structure is supplemented by a trip to the virtual reality lab where students enter and explore a human cell.

The relevance of 3DVLEs (also known as 3 Dimensional Virtual Learning Environments) can thus be summarized in three broad areas:

Accessibility: If taking an Asynchronous curriculum, student has the availability to access the course after office hours. For Synchronous and Asynchronous instruction, the student has the flexibility of being in the safety of their own home.

Interactivity: There is much evidence to show that students benefit from actively engaging with their course. More specifically, the advantages relate to feedback, practice and customization.

Communication: This element is must be increased in a VLE. It helps the student to feel part of a learning community. Tools used are bulletin boards, being able to “play-back” a session, chatting, email, and instruction & announcements are current due to the live instructor.

Traditionally, the primary source for obtaining information would be the encyclopedia generally available in the library. But now, we access to interactive 3D animation multimedia, the student would collect various textual materials about the particular topic from sources on a CD-ROM. With a multimedia approach, the student could also access Web sites on the Internet to get more information. The student could then add film clips on the particular topic in their natural habitat (all may be from the same CD-ROM) and blend them into a report. Then by adding titles and credits, the student now has a new and original way of communicating his/her own individual perspective.

Besides student use, teachers should find 3D animation multimedia of great use in delivering their lessons. For example, a history teacher could use a multimedia CD to create a lecture on the non-violence movement by using film clippings and audio tapes on Mahatma Gandhi or Martin Luther King, also by incorporating other audio visual information with text to make the subject come alive. All this material would be available on a videodisc. Similarly, a university professor might use a 3D animation multimedia CD to prepare or to update information or to teach so as to enliven and also add insight to his/her teaching, thereby improving the quality of the course. The uses of 3D animation multimedia need not be seen as a tool for classrooms only.

DISADVANTAGES OF 3D VIRTUAL ENVIRONMENT

3D virtual animation multimedia requires high-end computer systems. Sound, images, animation, and especially video, constitute large amounts of data, which slow down, or may not even fit in a low-end computer. Unlike simple text files created in word processing, 3D animation multimedia packages require good quality computers. A major disadvantage of writing multimedia courseware is that it may not be accessible to a large section of its intended users if they do not have access to multimedia-capable machines. For this reason, courseware developers should think very carefully about the type of multimedia elements that need to be incorporated into applications and include only those that have significant value.

3D animation multimedia has other weaknesses too. While proponents of this new technology are very enthusiastic about its potential, they often leave the financial and technical issues unattended. Developments in 3D animation multimedia are very high and the process of developing effective multimedia takes time. Time spent on developing the 3D animation multimedia package requires money so that the true cost of an interactive programme mounts with each delay. Further, if the prerequisites for using multimedia include to computers with related software, the user must possess a minimum level of computer literacy in order to exploit the capabilities of this medium for learning. And finally, of the educator who is unfamiliar

with the production and design of multimedia courseware or packages can be equally complicating.

CONCLUSION

The future development of this active learning environment is to create the collaboration component which students can not only interact with the media but also interact with their friends. Therefore, the collaboration component will also help students improve their learning outcomes. The objective of the study is to advocate the use of 3D-VLEs and virtual objects in schools and colleges using distributed computing infrastructures in science subjects with the goal of bringing computer modeling and simulation in those subjects to new frontiers in complexity and to a new regime of time-to-solution. This will stimulate innovation and cost-effective but at the same time offer quality education. Such areas of application as in computational chemistry using VLEs cover traditional chemistry, materials science, molecular biology and environmental chemistry. Enabling and accelerating the transition of teaching and learning to Virtual learning environment will make students be more competitive, innovative and cost-effective to schools and colleges. This paper has discussed the potential educational applications of 3D environments. Although the potential of 3D environments as learning resources is clear, there is still a great deal of work to be carried out before designers can be sure about where 3D environments should appropriately be used and about how best to design them.

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