

THE ROLE OF VIRTUAL LABORATORIES IN THE CREATION OF E-LEARNING SYSTEMS.

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Abstract: Practical experience is an essential part of the learning process. However, many institutions lack the time and financial resources required to set up and develop research laboratories. A solution to this difficulty could be found in the adoption of Virtual Reality technology, which could allow the establishment of Virtual Laboratories that mimic the processes and behaviors that might occur in real laboratories. This article discusses a novel project that proposes and outlines an educational virtual laboratory that strives to match the needs of a real laboratory while also supporting communication and collaboration services. We propose a web-based system that allows users to conduct experiments in educational fields such as physics or chemistry in 3D multi-user worlds where users are represented by avatars and are provided with a variety of communication and collaboration services in order to simulate a real learning experimental process as efficiently as possible.

Keywords: Distance learning, Virtual reality, Multi-user virtual environments, Virtual Laboratories, Educational Virtual Environments.

INTRODUCTION

The widespread use of the World Wide Web (WWW) and the development of the Internet, as well as the advancement of network infrastructure and electronic communication, created all of the essential preconditions for using this powerful mode of communication for non-commercial reasons. Virtual Reality (VR) technology has been extensively proposed and recognized as a key technological advance for facilitating life-long education and a flexible workforce in the technological industry. The successful translation of abstract notions into visualized events, as well as the ability of user engagement, is one of VR technology's distinctive advantages, that in real life could be limited due to distance, time and safety factors.

In education, virtual laboratories can refer to simulation environments with a human touch or to interfaces with genuine laboratory equipment. For everyone, online learning is the greatest option. This is a paradigm shift in the learning genre. Information may now be accessed, discussed, digested, and shared from anywhere. E-Learning has made education accessible to everyone, including office workers and housewives, without sacrificing quality.

E-learning is efficient and effective. It makes it simple to understand and absorb information. It improves the learners' ability to learn and apply what they've learned. Audio-Visuals aid in the retention of information for a longer period of time. E-learning allows you to keep up with today's students. This keeps you informed about current events. Traditional classrooms have nefarious aspects that might cause disruption. eLearning, on the other hand, allows for faster delivery of training. In eLearning, there is no such thing as a procrastinator. It's a great method to learn quickly! Lectures can be attended at any time and in any quantity. Revisions are difficult in traditional schools. If you miss a class, unlike traditional learning, you can always catch up online. E-learning provides teachers with a greater degree of coverage in terms of delivering content on a regular basis. This guarantees that learning is consistent. E-learning is cost-effective because it is a quick and simple way. Long training periods, infrastructure, stationary, and travel expenses, among other things, are all decreased. It is a friend to individuals who are nervous in gatherings and feel isolated. It allows you to learn without having to leave the conveniences of your familiar surroundings.

How e-learning helps students/benefits of eLearning to student. E-learning has shown to be a significant resource for students all around the world. Previously, knowledge was not available to everyone. In the academic province, students with financial limits, geographical limitations, or physical disability had few options. The same people now have constant access to schooling. The current learning approach provides you with a renewed version of knowledge that you may access whenever you want and that is shared with millions of people from many areas. It's an exciting

learning moment for academics all across the world. Learners benefit from increased collaboration and worldwide opportunities provided via eLearning.

Virtual laboratories in education.

Practical experience is an essential part of the learning process. Many institutions, however, lack the time and financial resources required to set up and develop research laboratories. The adaption of Virtual Laboratories, which might be proved as an important teaching instrument that deals with the absence of practical experience in education, could be a solution to the aforementioned problem. The following are only a few of the numerous advantages of virtual laboratories:

1. Resource sharing becomes a reality, improving the utilization of costly equipment.
2. Access to educational and research material is facilitated for both students and professionals.
3. Scientific investigation standards are established in areas where practical experimentation is a required part of research.
4. Reduction in travel time leads to productivity enhancements.

"Both initiatives generated virtual laboratories that were significantly simpler than the projected result due to technical issues and a lack of resources." The conclusion is that the construction of successful virtual laboratories necessitates a significant investment of both resources and time." On the plus side, the authors state that despite technological production challenges, users were able to obtain the desired learning results, implying that virtual environments may be developed with minimum resources. To that purpose, the authors offer the following suggestions, which we duplicate here:

Be very explicit about the virtual laboratory's aim and the environment in which it will be used. Media consumers, particularly teenagers and young adults, are extremely media literate and can immediately spot attempts to pass off a linear display as an interactive laboratory, for example. Consider the type of media you want to create, such as simulation, laboratory, or demonstration. Make it apparent to the user what they're dealing with. Strive to use the simplest possible design and

technology, still meeting the demands efficiently. In some cases advanced technology such as virtual environments or even virtual reality might be needed, but a technology-minimalistic strive will lower the risk that a too advanced technology is used for its own sake. The most eye catching techniques might not always correlate with what is relevant to show.

Match realism and accuracy levels to the intended target audience as well as the desired learning outcome.

Constantly examine ways to improve the virtual laboratory in order to improve learning outcomes. It can be beneficial to offer assistance when needed and to visualize things that would be impossible in a real laboratory. Weigh the benefits of having a virtual laboratory that closely resembles real-life laboratory exercises against this potential.

Regard a virtual laboratory as an illustrative playground that requires external support in the form of guiding, explanatory texts or teacher debriefing. The virtual laboratory provides the students with experience and observations, but does not always necessarily provide understanding on its own. Guidance is often necessary to help the students to understand the illustrated scientific phenomena.

The expanded functionalities that a Virtual Environment can provide, combined with the growing research interest in distance learning, has resulted in the development of a wide range of applications that use Virtual Reality technology to support the learning process, resulting in Educational Virtual Environments. Apart from the technology components of Virtual Reality, the phrase "educational" raises a number of difficulties, such as access to learning content and the educational model that should be employed for the most efficient implementation of the learning process. Experimental learning or "learning by experience," in which users are encountered as agents rather than passive receivers of information, is one of the most rapidly expanding trends in this direction. Experiential learning necessitates a high level of user interaction, both with other users and with the items offered. The Virtual Radiopharmacy Laboratory, which was constructed as part of the project and will be discussed in the next section, is an example of such an environment. This is a

research project focused on developing a multi-user 3D environment for instructional purposes. Users are represented by avatars in a virtual world in order to actualize the learning process in 3D environment.

In conclusion, Uzbekistan has been affected by the evolution of information and communication technologies, both in the economic and educational fields. In terms of education, it's worth noting that during the last decade, the majority of secondary schools have been outfitted with computer labs to help pupils become acquainted with the information society and new technology. Furthermore, a network for the internal connection of all schools has been built, allowing individuals in the secondary education field to communicate and collaborate. However, the educational system has not fully utilized the school's new possibilities computer laboratories could present.

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