

# A Review on E-Learning, Platform and Virtual Reality

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**Abstract:** *E-learning is a new teaching model nowadays. It gets further development and improvement with the impetus of the Virtual Reality (VR) technology, which can build a friendly human machine interface. VR is becoming increasingly important as a learning tool in the schools as well as in universities, due to its interactive and animated features. VR can be an effective method for teaching and reinforcing complex concepts by allowing students to interact with the visualization tools. The pattern which integrates the VR and e-learning technology not only enriches teaching patterns but also improves learners' ability of analyzing and solving problems. The virtual learning environment provides a new study method for students to understand certain events which have proven inappropriate and difficult in traditional education. This paper highlights and discusses the issues and challenges associated with implementing a virtual reality based e-learning environment. It explores educational uses of an e-learning environment in combination with VR technology.*

**Keywords:** E-learning, E-learning Platform, LMS, virtual reality

## 1. Background of E-learning

Teaching can be defined as one of the strategic responses to the requirements of natural learning processes for the purpose of obtaining optimum results; the process of teaching must work on respecting, facilitating, and enhancing the natural learning processes. Also, the process of learning demands logical sequence and continuity since it is not just straightforward transmission of the information; it is requiring instruments, techniques, methods, and procedures for obtaining good results[1]. E-Learning can be specified as "another method of learning and teaching", which includes elements such as "instructions provided through many electronic media such as CD, video/audio tapes, extranets, internet, satellite broadcasts, intranets, interactive TVs". Furthermore, electronic-learning is the foundation for online learning and blended learning. The learning environments, the teaching methods, and the needs of learners have changed over the past decades. Millions of learners today are using digital tools to learn and acquire new skills. Additionally, the new generation requires a more mobile way of learning [2, 3]. E-learning works by integrating many smart tools that are created for being supplemental intelligent tools. Also, it might be altered for fulfilling the creative minds of students [4]. Virtual learning or electronic-learning is now helping old style face to face teaching (students and teachers interacting physically in classrooms). By using it, traditional teaching was largely affected by converting students into being active participants. Especially, since the capacity of classrooms is limited, E-learning is considered an excellent complement/alternative as it is just requiring an internet connection and a computer. Furthermore, the flexibility of E-learning (with regard to place and time) made it a significant method for teaching, also costs are another reason for such importance, as conventional teaching includes more expenses of staff and costs more compared to E-learning [5, 6].

## 2. Types of E-Learning and Learning

There are three learning approaches: distance education

(virtual), part time education (the part at virtual, part at school or at distance), and full time education as can be seen in the Figure (1). Full-time or face to face education was traditional education type and the majorly utilized method in common courses at all levels, necessitating students and teachers to be together in classrooms, while the second method is combining learning in classrooms and at distance utilizing state of the art technologies [7]. There are two kinds of E-learning, internet based and computer based. The latter includes using various software and hardware commonly providing for using Information and Communication Technology. Also, in such type, the computers were utilized rather than conventional approaches by offering interactive software as one of the support tools in a class or as one of the tools for self-learning outside the classes. Yet, with regard to computer managed instructions, computers were used to store and retrieve information to allow in the management of education. Yet, internet based learning can be defined as an additional enhancement to the computer based learning, it is making the content available on the internet, with the readiness of the links to associated knowledge sources, for instance, email services as well as references that might be utilized via learners at any place and time [8].

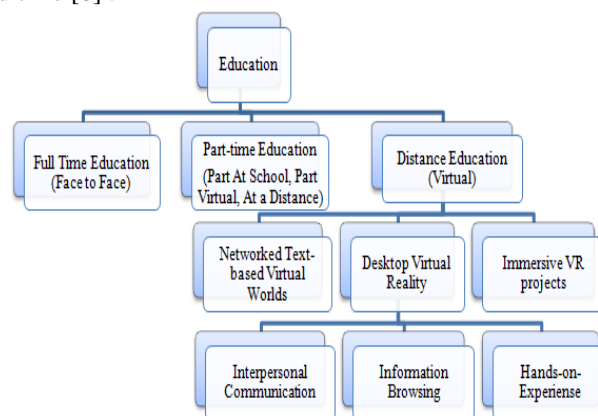


Figure 1: Approaches to education [7]

### 3. The Platform of E-learning

A platform of E-learning might be defined as a software application that contains various tools to manage the content, communicate between the teacher and the student, evaluate and monitoring the education process the aim of the platform is to provide technical support to reduce time and effort and help learners achieve their goals effectively and efficiently [9].

#### 3.1 Platform Classification

The platform can be classified into three types according to the platform function and the aims of the e-learning platform.

##### 3.1.1 Learning Management System (LMS)

LMS can be specified as one of the conventional approaches of electronic-learning that was categorized as courses; social software involving social bookmarking sites, social networking sites, wikis, blogs, and so on, were used via a lot of educators for meeting their growing requirements in educations[10]. Based on [11] LMS is a type of platform system that is primarily focused on the education area, and provides control over contents as well as users interacting with it.

Presently, LMS is one of the significant parts of the educational systems in the majority of universities, also there is more and more interest in hybrid methods blending the online and class activities [12]. Utilizing LMS in the educational environments allow communications between teachers and students as well as allowing new challenges [13].

##### 3.1.2 Content Management System (CMS)

A CMS is a type of platform, the major functionality of CMS that it is used with small projects which need to generate Dynamic content in the system. and provide communication methods such as chats, e-mails, and forums. For instance, one might indicate Core Media CMS, Mambo, Drupal, Content Management Server, and so on. [14].

##### 3.1.3 Learning Content Management System (LCMS)

LCMS can be defined as one of the systems integrating the management and administrative features of LMS with the creation of the content of a CMS, to increase the robustness. The main role of the LCMS is to produce a collaborative authoring environment to create and maintain the learning contents [15]. Also, an LCMS have tools for publishing and modifying content and provide virtual communication spaces for the remote learner to interact with each other or to interact with teacher example for communication space discussion forums and live chat rooms [14].

### 4. Benefits and Drawbacks of E-Learning

Today, E-learning is majorly applied in schools and universities, especially after the great benefits it has achieved

for learners. Like everything has benefits, e-learning has some drawbacks [16, 17].

#### Benefits of E-Learning

- 1) E-learning allows the learner to access a huge amount of information via the Internet at any time. In addition, it provides an opportunity for communication between teachers and learners through electronic communication sites
- 2) E-learning is less expensive than traditional education, as information is transferred to students without the need for them to go to universities or travel to faraway countries. It also provides opportunities to accommodate the largest number of students without the need to build schools and universities.
- 3) E-learning provides different ways of learning and thus helps a large number of students in their studies despite their different cultural levels and the extent of their understanding.

#### Drawbacks of E-Learning

- 1) E-learning faces difficulty in controlling exams, evaluations, and cheating detection, and frequent use of the Internet for long hours may lead to a waste of learners' time if it is not used correctly.
- 2) E-learning lacks direct supervision by teachers over the learners. In addition, e-learning can be less efficient than traditional learning because there aren't direct face-to-face interactions between teachers and learners.
- 3) Despite the many fields that apply the e-learning method, in some scientific fields, it is not preferable to use e-learning because it needs to be applied faces to face, such as pharmacy and chemistry sciences.

### 5. Background of VR Applications

In recent years, there has been a constant interest in using virtual reality (VR) for education. VR becomes also more attractive as a tool to enhance classroom experiences [18]. Virtual-reality (VR) has been used to train professionals in many different domains (e.g., medicine, military, and firefighting) since its early years[19]. The systems of virtual technology might have many approaches to enhance immersions and interactions. Majorly, the systems of VR might be categorized into non-immersive, semi-immersive, and immersive [20]. In the case when immersive systems are creating a sense of discovering a virtual world, then non-immersive systems (computer displays) or semi-immersive (utilizing many projection screens rather than glasses) are creating a certain degree of realism. Yet, various implementations might have various immersion degrees; the following is representing list related to the categories of virtual technology producing various immersive perceptions [21]:

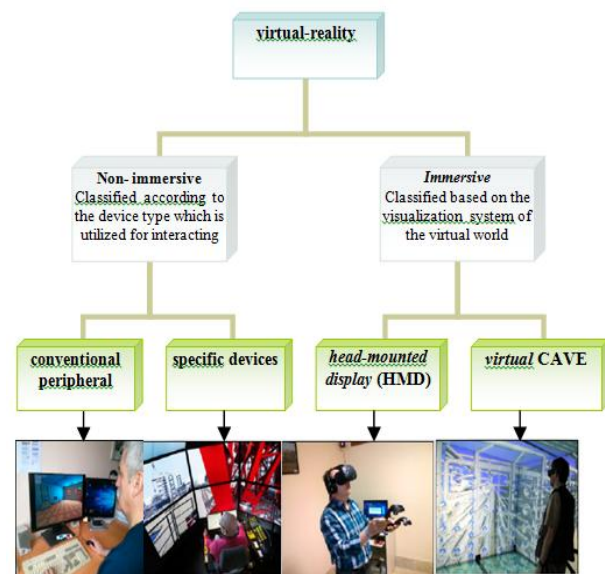
- **Desktop VR** that is requiring a typical computer display. The interactions with the virtual world were limited to a joystick or mouse of a desktop computer, yet it doesn't

need costly software or hardware, thus, it might be developed without complications.

- **Cabin simulators**, majorly utilized for recreating and simulating a real cabin, such as a car, cockpit, or vessel bridge. The windows of the cabin were replaced through computer displays of high-resolution, and it might be equipped with the surround sound. There is a possibility for adding movements for more realism, as response actions to the controls of users.
- **Projected reality** includes real time moving avatar of users that is visualized on a wide screen.
- **Augmented Reality**, requiring dedicated mobile devices or immersive glasses for visualizing augmented objects overlapping the surrounding real environment.
- **Telepresence**, which might be utilized for impacting and operating something which is real, yet in a distinctive location, such as a nuclear power plant, laboratory, and so on.
- **Visually coupled systems** that were majorly related to military aviation. In addition, the systems is placing the screens at the eye level of users, and connect the head movement of the user to the displayed image, while the system involves sensors for tracking the eye movement of users, and has the ability to determine what is being looked at.

## 6. Virtual Reality in E-learning

Applications of VR in education may be categorized based on the visualization as well as interaction devices into two major classes: (a) non immersive (common "window in the world"), in which the vision of the user of the world was via a flat-screen of computer which acts like a "window"; and (b) immersive, entirely presenting the virtual world to the user through the use of the glasses with 2 small screens that are located before user's eyes. Every one of the previous classes is divided as well to the sub-categories below. On one hand, non-immersive resources are categorized based on the type of the device which is utilized to interact with the virtual world: (a) through the use of the traditional computer peripherals, such as keyboard or mouse. and (b) through the use of special devices of interaction, which are similar to the devices that are utilized in real controls, such as the vehicle control cockpits and machine operation consoles. However, the Virtual Reality immersive applications are sub-divided as well to 2 sub-categories, based on the system of visualization of the virtual world: (a) head mounted display (HMD), consisting of active glasses with a small monitor which is adequately located in front of each one of the eyes; and (b) cave automatic virtual environment (CAVE), where the virtual world is showing on the floor, walls, and ceiling of the room through a variety of stereoscopic projectors. With regard to such conditions, users should be wearing passive stereo glasses for the sake of achieving a 3-D virtual worldview [22]. Figure (2) show VR resource classification.



**Figure 2:** VR resource classification based on devices of visualization and interaction [22]

To sum up, there are major aspects related to the reasons for using and not using virtual reality technologies [23, 24].

### Using Virtual Reality

- 1) Training or teaching utilizing a real thing is complicated, not possible, risky, and inconvenient.
- 2) Costs, travel, or/and logistics related to obtaining gathering a class for training is an alternative of high importance.
- 3) Required for giving the disabled a possibility for doing activities and experiments that they have no ability to carry out otherwise.
- 4) The mistakes that are made via trainees or learners utilizing a real thing might be demoralizing and/or devastating to learners, cause harm to the environment, able to do unintentional damage to property, able to do damage to equipment, or expensive.
- 5) Creating participatory activities and environments which might be just present as computer-generated worlds

### Not Using Virtual Reality

- 1) No alternative for training/teaching with the real thing.
- 2) Interactions with real humans, students, or teachers, are required.
- 3) Utilizing a virtual environment might be emotionally or physically harmful.
- 4) Utilizing a virtual environment might lead to "literalization", which is a simulation which is very convincing in a way that a few users might confuse the model with reality.
- 5) VR is very costly for justifying utilizing, specifying the anticipated outcome of learning.

## 7. Conclusion

This paper focused on virtual reality's application in e-learning. It's a new area where the possibility of exploring the environments through the objects manipulation scattered



in the virtual environment, related to the content to be learned can be seen by student. Some learning activities are hard to perform in a real environment because of high expenses, lack of infrastructure availability or dangerous performance. In virtual worlds it's possible to perform simulations and activities of any kind. This paper highlights and discusses the challenges and issues of learning in virtual reality such as Teaching activity, Accessibility, Active Participation of Students, Dynamic Teaching and Learning, e-learning platforms. This study will make a significant contribution in enlightening educators and e-learning practitioners to the potential of VR technology-to-support-and-enhance-learning.

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