Chapter XII
Using Multimedia and Virtual Reality for Web-Based Collaborative Learning on Multiple Platforms

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ABSTRACT

Since the advent of the Internet, educators have realised its potential as a medium for teaching. The term e-learning has been introduced to describe this Internet-based education. Although e-learning applications are popular, much research is now underway to improve the features they provide. For example, the addition of synchronous communication methods and multimedia is being studied. With the introduction of wireless networks, mobile devices are also being investigated as a medium to present learning content. Currently, the use of 3-dimensional (3D) graphics is being explored for creating virtual learning environments online. Virtual reality (VR) is already being used in multiple disciplines for teaching various tasks. This chapter focuses on describing some VR systems, and also discusses the current state of e-learning on mobile devices. We also present the VR learning environment that we have developed, incorporating many of the techniques mentioned above for both desktop and mobile devices.

INSIDE CHAPTER

E-learning has become an established medium for delivering online courses. Its popularity is mainly due to the convenience and flexibility it provides for users, allowing them to learn without time or location restrictions. Many different e-learning systems are currently available, the majority of which are text-based and allow users to contact the course tutor via electronic mail or discussion forums. These courses essentially offer access to a common pool of resources that allow users to gain knowledge and often qualifications. Researchers are now exploring new ways of making the online learning experience more engaging and motivating for students. Multimedia and communication technologies are being added, and together with 3D graphics, are fast emerging as a means of creating an immersive online learning experience. With the advent of mobile technologies, m-learning is showing promise as an accompaniment to online courses, offering the prospect of a modern and pervasive learning environment.

This chapter discusses the benefits 3D environments offer the e-learning community. We outline how this type of system emerged and describe some currently available systems using these new technologies. In particular, we describe in detail our own virtual reality environment for online learning and the features it provides. We discuss the extension of this system to a mobile platform so that users have anytime, anywhere access to course materials. Finally, we put forward some thoughts on future technologies and discuss their possible contribution to the development of a truly ubiquitous and pervasive learning environment.

INTRODUCTION

Distance learning has gone through a number of iterations since its introduction in the 1800s. The notion of distance learning grew mainly out of necessity, and helped to overcome geographical, economical, and cultural barriers that prevented people from partaking in traditional classroom-based education. Over the years a number of distance learning applications have emerged to address these issues. The evolution of such systems can be clearly linked to the technological developments of the time. This chapter focuses on giving a brief overview of the changes in distance learning from its inception to today, before concentrating on the distance learning technologies currently in use. We provide details of how the latest technologies and demand from students have led to the development of 3-dimensional (3D) e-learning systems. We also look to the future, suggesting what the next generation of technology can bring to distance learning. We pay particular attention to the need for ubiquitous and pervasive means of e-learning, and in doing so describe our own system, which uses state of the art technologies to deliver learning material to students both on a desktop computer and while they are on the move.

In the background section, we describe how distance learning has evolved from a simple postal service offered by universities to a sophisticated tool that utilises the convenience of the Internet. As the discussion progresses toward the introduction of 3D graphical environments to distance learning applications, the origins of 3D graphics and their uses are also presented. Multi-user environments for distance education is a major area of research at present, and so the latter part of the section provides a synopsis of the history of multi-user computer applications. We also present a brief discussion on the current uses of mobile technologies, which are now emerging as promising tools for e-learning.

In the main section of this chapter, we describe how recent technological advancements and requirements of students and tutors have led to a new breed of computer-based learning systems utilising the latest 3D graphics and communication tools. We detail a number of such systems outlining their strengths and weaknesses, in particular