

Chapter 17

Web-Based Approaches in Engineering Education

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ABSTRACT

Among different branches of human knowledge and sciences, engineering, like medicine, is more involved in practical and daily-life aspects where the virtual utilities and educational software can be utilized to consummate the practical features of engineering education. Furthermore the virtual environment of e-learning courses can provide cheaper, safer, more comprehensive and more inclusive approaches to engineering educational material. The aim of this case is to count the requirements of engineering education and to accord the facilities and inadequacies of e-learning as training technique in engineering instruction.

INTRODUCTION

Distance learning is a progressive method of pedagogy employing the electronic technology to transfer the education to the students who are not on site and allows them to participate in educational activities on their own time. Since 1728 which the first ideas of distance learning has flickered through application of postal services, this technique has passed through several transition states like radio, television, telephone, computer and

internet. Emersion of internet made a revolution in distance learning leading to a new generation called web-based learning. Web-based learning is practically the milestone of electronic learning or e-learning, profiting the popularity of the internet as a fast information source.

Connolly and Stansfield have categorized the historical progress of web-based training through three distinct generations. The first generation took place from 1994-1999 and was marked by a passive use of the Internet where traditional materials were simply repurposed to an online format. The second generation appeared through 2000-2003.

DOI: 10.4018/978-1-61520-869-2.ch017

This spectrum is marked by the transition to higher bandwidths, rich streaming media, increased resources, and the move to create virtual learning environments that integrated access to course materials, communications, and student services. Internet, Intranets, local area networks (LAN) and wide area networks (WAN) have offered the learners the opportunity to use distance learning beyond pre-recorded classes, educational software and virtual laboratories. The third generation is currently in progress and it is marked by the incorporation of greater collaboration, socialization, project based learning, and reflective practices, through e-portfolios, wikis, blogs, social bookmarking and networking and online simulations. Online forums, blogs and discussion boards have become a precious resource in Learning Management Systems (LMSs). They allow learners to communicate with their peers and tutors, empowering them to socialize and learn together online. Furthermore, the third generation is progressively being influenced by advances in mobile communicating (Harper 2004; Connolly 2007; Monahan 2008).

Due to its singular capabilities, web-based learning has entered and is widely used in every field of science and technology. It is not only warmly welcome at schools and universities, but also in factories and houses. However utilization of web-based learning technique requires tender and comprehensive attentions in designing, applying and assessing configurations, directed by when, where and for which purpose it is being employed.

Among different branches of human knowledge and sciences, engineering as well as medicine is more involved in practical and daily-life aspects, where the virtual utilities and educational software can be utilized to consummate the practical features of engineering education. Furthermore the virtual environment of e-learning courses can provide cheaper, safer, more comprehensive and more inclusive approaches to engineering educational material. What usually the students need to learn in laboratories and workshops and it

is costly and demanding for the universities and the schools. The aim of this chapter is to count the requirements of engineering education and to accord the facilities and inadequacies of e-learning as training technique in engineering instruction.

ENGINEERING

Engineering is the discipline of implementing of science and mathematics to develop explanation for the problems and to find practical solutions that have an applicable outcome. Engineering is the knowledge of creating a new world based on the rules which science has already discovered. Engineers suppose to be inventors. They design and manufacture machines, processes, systems and even economical constitutions. Utilizing science and mathematics, they observe the world, find the troubles, dream up new ideas and realize the dreams to improve the quality of life and make our world a more comfortable place to live.

Based on scientific principles, every engineering discipline has two main tasks (Wintermantel 1999):

1. To model subsystems using the theoretical and methodological scientific knowledge. In this respect, engineering is not different from the natural sciences.
2. To develop methods and procedures, which allow real systems in all their complexity to be designed and constructed even if not all subsystems have been precisely modeled due to a lack of a thorough knowledge of the underlying physics and chemistry.

The Engineers Council for Professional Development (ECPD), in USA has defined the term of engineering as: “the creative application of scientific principles to design or develop structures, machines, apparatus, or manufacturing processes, or works utilizing them singly or in combination; or to construct or operate the

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