

Chapter 54

Innovative Teaching Practice and Assessment with Technology Applications in International Biomedical Engineering Education

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ABSTRACT

The advantages of the Internet in education are widely acknowledged by students and teachers all over the world. The authors have developed EVICAB as a free-access portal for e-learning with a full curriculum in biomedical engineering. It may be used as a virtual campus to support classroom lecturing or for distant learning. EVICAB provides educational material in various formats: video lectures to be viewed on a PC, an iPod or a media phone, lecture slides, textbook, exercises. It also offers a system for an Internet examination, which makes it possible for the students to take the examination anywhere in the world, where an educational institution provides proper environment. In this chapter, the authors briefly introduce the technology of the EVICAB portal and discuss in more detail the application of the Internet examination system. Educational technologies for developing teaching and learning via the Internet are widely available and user friendly.

INTRODUCTION

The Internet has reached a strong and stable position in education (Limayem & Cheung, 2010), (Bufardi, 2011). It's benefits, e.g., increased accessibility to information, ease of updating, standardizing and distributing content, accountability, interactivity, self-paced speed, usefulness for international students

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and also for disabled students, as a support for classroom learning and in distant learning are nowadays widely acknowledged by students and teachers all over the world (Hong, Ridzuan & Kuek, 2003), (Ruiz, Mintzer & Leipzig, 2006), (Kybartaitė, Nousiainen & Malmivuo, 2009) (Smarkola, 2008). Teaching and learning via the Internet may be equally well applied in any discipline, e.g., medicine (Bove, 2007), (Choules, 2007) mathematics (Ferbar & Trkman, 2003), computer sciences (Buerck, Malmstrom & Peppers, 2001), language learning (Yang & Chen, 2007), and others.

Internet as an integrating technology contributed to the arrival and implementation of distance (Keegan, 1990), electronic (Cloete, 2001), web-based (Khosrow-Pour, 2001), online (Anderson & Fathi, 2008), distributed (Locatis & Weisberg, 1997), Internet-based (Cook DA & al., 2008), computer-based (Lowe, 2002), computer-assisted (Greenhalgh, 2001), technology-based (Henderson, 1998) multimedia-based (Zhang, 2005), network (Riel & Harasim, 1994), blended (Garrison & Kanuka, 2004), portable or mobile (Evans, 2008), ubiquitous learning (Chen, Chang & Wang, 2008), educational semantic web (Bittencourt & al., 2009) or intelligent education model (Laureano-Cruces & al., 2010), etc. Although different authors suggest variant definitions, all these terms quite often are considered as synonyms. The terms “e-learning” (Nagy, 2005) and “virtual learning” (Anohina, 2005) are commonly considered as the umbrella terms describing a type of learning that depends on or is enhanced by the latest information communication technology (ICT).

Nowadays there exist many different portals enabling learning via the Internet, i.e., Yovisto (Waitelonis & Sack, 2009), Webcast Berkeley (Machnicki & Rowe, 2002), MIT Open Course Ware (Abelson, 2007), Videolectures. NET (Grcar, Mladenec & Kese, 2009), Connexions (Henry, Baraniuk & Kelty, 2003) Khanacademy (“Khan Academy”, 2013) or various course management systems, e.g., Moodle, Blackboard, WebCT, Ilias (Romero, Ventura & Garcia, 2008), etc. Also providers of massive open online courses (MOOCs) such as Coursera, EDX, Udacity, Erasmus, Academic room (Smith, 2012) are setting up possibilities to enhance learning experience via the Internet.

Different approaches are used for implementing learning via the Internet. The simplest form is electronic distribution area when the lecturer places notes and presentations into an online repository or file server with a shared drive, which is accessible through a network, often a Local Area Network (LAN). Usually students registered on the network have access to the course environment and they download the material. Another form is when lecturer uses own-developed system, externally developed learning management system (LMS) or virtual learning environment (VLE). The main material is lecturer’s notes and presentations, but other tools such as chat rooms, discussion forums and wikis are also available. Often all students may access such environment but only registered ones may leave comment or questions in the system.

These portals provide access to a wide list of academic materials – learning objects, e.g., courses taken on video directly from a classroom, lecture slides, documents in a portable format, animations and assignments. Some of these portals are based on connectivistic theory and do not require user registration, some of the portals, particularly course management systems that are based on social constructionist pedagogy, enabling not only teachers but also students to upload their academic materials to the system and allowing educational data mining, require user registration.

Consequently, the question arises how to evaluate students’ achievements when they are learning via the Internet. Computer-based assessment has become popular as a testing modality replacing the traditional written pen-and-paper format (Lim & al., 2006). Particularly popular this form of testing became in medical education (Vrabel, 2004), (Lee, 2009), (Caudle & al., 2011). Such terms as computer-based testing, e-assessment, computer-administered or Internet-based testing are also commonly used as synonyms. The

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