Chapter 2
Distance and Online Learning

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ABSTRACT

The aim of this chapter is to present a conceptual and practical overview of online learning pedagogies for the 21st century courses including science, technology, engineering, and mathematics (STEM) courses. Online learning and various alternative innovative forms of online small-group learning have been developed and implemented worldwide to replace or supplement the traditional face-to-face classroom instruction. Online teaching/learning using small-group learning methods such as problem-based learning, cooperative learning, collaborative learning methods, and team-based learning are examples of such innovative reform-based collaborative student-driven pedagogies that are covered in the chapter. These innovative 21st pedagogies make learning in online environments more stimulating, engaging, and motivating for students to deeply and meaningfully learn the course content and maximize their persistence in the web-based online courses.

INTRODUCTION

*O*nline learning, which is also referred to as e-Learning, Cyber learning, or Web-based learning, is an innovative student-centered instructional method for teaching/learning of the digital course content delivered in distance via the internet and mediated by computer mediated communications (CMC) and web-based computing technologies (Report of the NSF Task Force on Cyberlearning, 2008). The National Science Teachers Association (NSTA) supports online learning as an important component of student's academic learning experience in the 21st century student-driven classrooms and defines web-based online learning as the effective learning process created by combining digitally delivered content of course materials with academic learning support system (NSTA, 2008). Specifically, online learning, which is a technology based student-centered learning approach, refers to teaching and learning settings that employ networked computer mediated communications (CMC) technologies that include the World Wide Web (Internet) and course management systems (CMS) and can be accessed through satellite, cable, broadband, or wireless technologies,

Historically, distance education has been provided for many years to deliver courses from a distance location, first via postal correspondence and then via the mass media of radio and television. But until the invention and growth of the Internet, it was not possible to provide distance education to anyone, anytime, and anywhere in the world. Distance-based online learning is the latest form of distance education to deliver instruction worldwide, where the learners and instructor are separated by place and time.

For the last three decades, the emergence of World Wide Web (WWW) communication networks, technological advances in Information Technology (IT) and handheld mobile technologies (e.g., tablets, smart phones), and powerful computer technologies has been continuously redefining, reshaping, and advancing the concept of distance learning and computer supported learning (CSL), including online learning to deliver the instructional course content. The Internet provided a rich new technological medium for teaching and learning that has evolved over the last two decades. Meanwhile, it produced research results that have propelled us closer to understanding how to effectively use Internet-based methods for delivering instruction and learning. Therefore, the technological revolution of the internet and the World Wide Web (WWW) has a great impact on the teaching of various subject matters across all levels of schooling.

The online courses are delivered via the internet in the form of Web-based courses with instructional materials that specifically designed for successful implementation of the online courses such as: (a) Electronic written text course materials, PowerPoint slides of course content, instructional digital videos, audio-recorded lectures, and video-taped lectures and course related materials; (b) Interactive synchronous and/or asynchronous group discussions via web-based discussion boards and platforms to share and foster ideas about the various topics of a course; (c) Team-based collaborative projects, and (d) Electronic assessment tools specifically designed to assess the learnt content of the online courses (e.g., quizzes, assignments, exams).

However, for the last two decades, the adoption rates for online learning have been continuously increased in high schools and higher education institutions and various Course Management Systems (CMS) and platforms are used to facilitate the delivery and the process of online courses. Therefore, we are witnessing an exponential increase in designing and delivering online courses by two-year and four-year higher education institutions as well as middle and high school institutions in the United States and worldwide. The increased popularity of online education by students, faculty, and academic institutions stems from its many advantages including, for example, its potential for providing more flexible access to instructional content and materials of web-based online courses to anyone from anywhere and anytime around the world.

Accordingly, there is strong evidence that online enrollments have demonstrated continued substantial growth at rates of twenty-one percent, which far exceeds the total higher education student population growth of two percent over the same one-year period (Allen & Seaman, 2010). In 2012, there were over 6.7 million students taking at least one online course with an increase of nearly one million students from the previous year (Allen & Seaman, 2013). Globally, there is also growing number of students taking online courses in other countries of the world such as Canada, China, India, United Kingdom, and other countries worldwide. According to the report funded by the National Science Foundation (NSF), online learning has the potential to transform education throughout a lifetime, enabling customized interaction with diverse learning materials on any instructional topic from anywhere and anytime across the globe (Report of the NSF Task Force on Cyberlearning, 2008).

In online courses, instruction takes place and delivered via the internet and web-based platforms that enable and facilitate the use of online chat rooms, threaded discussions, internet learning activities,

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