

Chapter 5

Blended Learning Examples in Education and Chemistry

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ABSTRACT

The blended revolution that has empowered students in developing nations is just now spreading to developing countries. With improved Internet access, students in these regions now have opportunities to experience blended and mobile learning, creating new markets in Asia, Africa, and the Pacific for universities that offer blended programs. Unlike the e-learning revolution of the 90s that was dominated by for-profit institutions, public universities will be major competitors for international students wishing to earn foreign degrees. The Asian Development Bank report (2008) emphasizes that it is essential for economic development to provide increased numbers of skilled workers. Blended and mobile learning can assist countries with increased educational access and online providers opportunities to reach new international markets. Another emerging market for blended and mobile learning in developing countries is the untrained teacher. Until recently, adequate Internet access was not available to some regions most needing increased educational access. Now, the technology is falling into place to support blended and mobile learning. This chapter discusses two international blended and mobile learning courses—an undergraduate chemistry course and a graduate education course for teachers in online learning—being delivered to developing countries in the Pacific. The chapter focuses on instructional design, cultural considerations, technical issues, and initial findings.

INTRODUCTION

Technology has fueled the distance-learning evolution from correspondence courses, to radio and

TV, to videoconferencing, to online, and now to blended and mobile learning. With each advance, the quality of distance learning has improved. Correspondence courses, televised courses, and radio delivery, once popular, increasingly are giv-

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ing way to online delivery. In the 1990s, online learning epitomized *distance learning*. With recent advance in educational technology, the level of interaction between students and the instructor in online courses now approaches that available to students in face-to-face classes. Progressing from email exchanges and web posting, today's online students can expect close interaction with instructors and classmates, prompt feedback, and a variety of online student services. Recent online advances have added audio and video communication, blogs, wiki's, and mobile access to the online mix. Whereas early distance learning distanced the instructor and student, blended learning and mobile learning can provide a level of teacher/student interaction approaching face-to-face learning. When students at a distance can see and talk with their instructors and classmates throughout the week, the *distance* in distance learning may disappear. For the new learner, large lecture classes may be the new distance learning.

The growth of online learning is the educational phenomenon of the twenty first century. According to Picciano and Seaman (2007), three million university students, and more than one million K-12 students were taking online courses in 2007—a 47 percent increase in just two years. Nevertheless, according to Adams (2008), some universities and businesses continue to prefer traditional degrees because online learning lacks face-to-face training and mentoring. Wang (2009) noted a similar resistance in the academic community to introduce online chemistry because it is recognized that personal interaction and laboratory activities are essential parts of the chemistry experience. With the marrying of online and face-to-face classes, blended learning can address this issue.

This chapter discusses two blended and mobile learning courses. The first, *Foundations Chemistry I*, is a freshman inorganic chemistry course. The second, *Online Methods of Instruction*, is a graduate education course for teachers. Both courses are available in the Cook Islands, Kiribati, the Marshall Islands, Nauru, Niue, Samoa, Solomon

Islands, Tokelau, Tuvalu, Tonga, Tuvalu, and Vanuatu. The education course also crosses the Equator, being taught throughout Micronesia.

The courses, which are approximately 80% online, incorporate a course management system (CMS), simulations, wikis, blogs, Skype, REACT, Nicenet, Facebook, You Tube, and Twitter. The face-to-face components consist of laboratories for the chemistry course, and training seminars for the education course. The instructional design for both courses is based upon the work of B.F. Skinner (operant conditioning) and Malcolm Knowles (1984). As such, the courses include weekly assessment and feedback, discussions, individual activities, and team projects. The instructional approach, which adapts many of the successful methods championed by the University of Phoenix, is designed to reduce stress, develop time management skills, and promote student engagement—all important factors in promoting student success and reducing attrition. The technology and instructional methods are described in the following sections.

Both courses were designed for low-bandwidth environments because several regional countries continue to have limited bandwidth and many students have slow home Internet connections. The chapter concludes with a discussion of future directions in blended and mobile learning.

DEFINITIONS OF BLENDED AND MOBILE LEARNING

The term *blended learning* in this chapter refers to courses delivered with a mix of online and face-to-face sessions. Approximately 80% of the two courses described in this chapter were delivered online. This proportion best met the needs of the students for ease of access and the university for cost of delivery. The term *online*, which is used interchangeably with *eLearning*, refers to a highly interactive, *student-centered learning*, method that uses both synchronous and asynchronous learn-

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