Perspectives on the Open Educational Resources

Abstract

This study introduced the open educational resources (OER) aided learning in a computer aided classroom. The course materials included the OER, composed in English, and a textbook translated into Taiwan’s traditional Chinese. Furthermore, the OER improved students’ conceptual understanding of both language and professional knowledge. Finally, the conceptual color plate analysis was employed to evaluate the related factors among universities, students, and teachers. Based on the statistics of the previous OER studies, it is predictable that OER aided learning may be popular in the future. Besides, the library plays a very important role in life-long learning, and will be crucial in the future because advanced guides and indexing of digital contents and OER can give the self-learner a better tool for life-long learning.

Key words: life-long learning, open educational resources, classroom, globalization, language.

Introduction

Although students have different individual talents, instructors always want to introduce them to as much information as they can. The concept is delivered from the era of Plato to nowadays. A low student-faculty ratio (SFR) may satisfy the needs of different students through student-faculty interaction. However, not every institute can achieve the target of low SFR for some specific reasons. SFRs of universities are from 7:1 to 25:1 in North America and Western Europe (Digest of Educational Statistics, National Center for Educational Statistics, USA, 2003), but the ratio can be very high in some specific regions or some countries. A high SFR might improve the educational resource aided teaching (Owston, 1997), whereas
other literature (Devitt & Palmer, 1999; Downes, 2007) presents the advantages and disadvantages of distance education applications. In addition, the open educational resources (OER) easily found in the web become indispensable as the usage of the Internet has been essential in our daily life (Johnstone, 2005). These studies pointed out that there are more and more publications discussing the issues related to OER. Due to the improvement of interactive web technology, OER provide further options of knowledge communications by information services. The OER of developed countries usually provided the professional and technical knowledge, but those of other countries generally introduced culture-specific materials. Websites such as the OpenCourseWare by Massachusetts Institute of Technology, Wikipedia, WolframMathWorld, United National Educational Scientific and Cultural Organization (UNESCO) Virtual University even welcome readers’ comments. Most of the feedback has to be written in English, and therefore knowledge exchange from non-native English speakers is limited. In this study, we propose a mechanism to compensate for the lack of the content in other languages on the Internet.

Dettori and Persico (2008) studied detecting self-regulated learning in online communities by means of interaction analysis. The study is crucial research on the creative virtual Lab. On-line materials for learning are convenient, but not suitable to every student if the environment of on-line regular self-learning is not well built. Because some students are not educated as active self-learners, the real classroom learning may be a good learning setting. Therefore, building an environment for self-regulated online learning is a very important issue for distance learning. OER can be transferred in many forms, such as papers, files, PowerPoint, CD-ROM, DVD, and video, etc. Therefore, school libraries might manage OER for the convenience of teaching and learning. This study proposed a computer aided classroom to store OER, and present the materials to the screens of students’ computers to guide them towards better learning achievements. Furthermore, Khelifi et al. (2009) pointed out the importance of OER for higher education from the economic point of view, especially for lower developed countries.

**Methods**

**A. Textbooks**

The main textbook printed in Taiwan’s traditional Chinese (TTC) was a translated version of “Signals and Systems” originally by Professors Haykin and Van Veen (2005). The textbook of the course was written by Professors Oppenheim and Willsky (1997). “Signals and Systems” is one of the most frequently visited courses
on MIT OCW. The core lecture notes were presented by Professor Gray et al. (Course description of Signals and Systems in MIT OpenCourseWare), accessible from MIT OCW. Besides, the instructor introduced the materials from Wikipedia, and WolframMathWorld in the class for students’ mathematical reviews.

B. OER
“Signals and Systems” is a course that covers the fundamentals of signal and system analysis with engineering and commercial applications in mathematical models. Some basic mathematical topics, such as unit circle, Euler’s identity, and phasor, are the fundamentals of this course. Computer-aided materials from OER, like MIT OCW, Wikipedia, Wikiversity, and WolframMathWorld, which can be accessed on the Internet easily and conveniently, are used to refresh students’ memory on these topics. With different presentations and explanations on the same topics from different websites, OER satisfied the needs of various talented students for mathematical knowledge.

C. Integrative teaching
The instructor employed the lecture notes and materials in English from OER, and a textbook in TTC to improve students’ English ability in class. This arrangement was aimed to enhance students’ English ability through the instructor’s explanation and translation of the English vocabulary and sentences.

D. Color plate analysis
The color plate analysis demonstrated the conceptual factor analysis of the questions. The color plate, which combines the red, green, and blue (RGB) colors, is very popular in editorial and image software. It is analogous to a 3-D Cartesian coordinate for quantified presentation, which can clearly display the relationships of the factors when their conceptual relationships are well-established, but hard to quantify. Researchers can easily fill the RGB color of various factors to present their ideas clearly. This study presented the figure of analysis with hyperlinks to present descriptions, pictures, and accounts, which were easily added and constructed systematically.

Results

A. Students’ comments
The general comment was “It was a little bit difficult to understand the contents of the lecture notes because OER were written in English”, but a few students gave
very positive comments. The demonstrations of the plots and videos actually aided the students to catch on the key points. With the limitation of language abilities, instructors’ extended explanation of the course material and English terms was the key to students’ comprehension. Dictionaries, machine translators, translation websites, such as dictionary.com and AltaVista, gave students the opportunity to conquer the difficulty of reading.

**B. The supplements**
Most textbooks presented theories in a formulized form to explain the concept of the theories. The quality and quantity of the selected supplements from OER helped students to learn the concept better. Instructors were able to explain the concepts with diversity, which made it easier for students to understand some abstract theories in the textbooks.

**C. Conceptual color plate analysis**
The conceptual color plate analysis presented in Fig. 1 shows the factors related to OER aided teaching and the relationship among universities, teachers and students. The model and hyperlink of A1, A2, B1, C1, and C2 can be presented with descriptions of the factors displayed by clicking on the codes of the factors. The hyperlink objects can be any objects in Microsoft Office, and are easy to implement. With this advantage, the conceptual color plate analysis could be employed in many fields, such as commercial applications of analysis and presentation.

**Discussion**
Foreman (2003) pointed out that information technology (IT) changes lectures in the higher education system. E-learning emphasizes the convenience of anytime and anywhere to learn. Khelifi et al. indicated that most universities are concerned about the cost and performance of commercial software products. Our study demonstrates a simple model of integrated teaching with textbooks and aided OER in a traditional classroom, which is equipped with computer aided tools to obtain the benefits of e-learning, and hence the students gave positive comments in the questionnaire. All the students in this study were part-time students, and working in electronic and computer companies. OER may become resources for their daily life and open a window to the Palace of Knowledge. Figure 1 displays the results of factors in color plate analysis, and further descriptions are presented as follows:
A. University vs. instructors

Educational management is an art to support and lead instructors who introduce the “matched knowledge” depending on the student’s interest and talent. It includes curriculum design, course material, instructors’ experience, lectures, students’ learning ability, equipment, and other factors. The contents of OER provided an international standard for lecture material, and enhanced the instructors at universities with a high SFR to improve the quality of course material. Even though the e-learning platform is highly dependent on the instructor’s IT ability, most instructors should be familiar with searching references on the web. Therefore, surfing OER for course material is easier than building a platform or uploading material to the platform for e-learning. OER aided learning can be widely implemented at universities and colleges around the world.

Instructors at universities usually have the obligation to teach students and conduct research in their professional fields. Preparing material for teaching is very time consuming. Some free blogs on the web, such as the Blogger of Google, are a useful tool. The blog allows instructors to put material on through simple processes without spending much time on server settings. Figures, plots, photos, voices, and videos can be uploaded to the blog with simple procedures as well. It simplifies the process of building open educational resources. Clarke et al. (2004) indicated that one of the lessons they learned from their experience at Brunel University is that “distance education programs must be based on existing programs”. OER balance the time between teaching and research by providing free support for course material. Besides, most OER provide the capacity of readers’ feedback. By communicating with other professionals, instructors can get the latest and most refined information. Therefore, it is a wise choice to employ OER for learning.

B. University vs. students

Schrum & Ohler (2005) pointed out that distance delivery techniques would make learning available anywhere without any geographic limitations. Furthermore, globalization is a hot topic at many universities, especially in some NNESNs. Students with proficiency in English can receive higher standings in communities like international entertainment and academic institutions. In a computer-aided classroom, integrated teaching can be accomplished with minimum equipment and cost. Course materials, originally developed in English from MIT OCW, Wikipedia, and Wikiversity, are easily and clearly displayed on students’ individual monitors and controlled by the instructor. In addition, many free tools are very convenient for learning, such as the evaluation versions of software or free educational resources which include National Instruments LabVIEW, Mathwork
MatLab, Microsoft Visual Studio, Altera Quartus II and others, as well as additional CD ROMs in textbooks. An important example of software improves students’ understanding of the course. The benefits of OER integrative teaching in the computer-aided classroom are much more valuable than the cost of constructing the classroom.
C. Instructors vs. students

Textbook selection is an important factor for teaching, and will be crucial in OER aided learning in the future. Associating materials between OER and the textbook will be one of the essential tasks of instructors. While CD-ROMs containing computer aided course materials enclosed in some textbooks may reduce the instructor’s effort on coming by the connections of different materials, information from OER summarizes the content of many textbooks. It ameliorates the quality and quantity of the supplements of the course. Because of discrepancies in the topic sequences between selected lecture notes and the translated textbook, association with the contents of lecture notes is important and indispensable to educators and textbook publishers. Nevertheless, the conjunction of the slightly different lecture notes between MIT OCW and the translated textbook reinforce students’ learning.

Combination of traditional teaching and distance education

Anisetti et al. (2007) developed open virtual laboratories (OVL), and showed that on-line learning students had more time to design, implement, and test their program, which resulted in better learning achievements than in the case of traditional teaching. In our study, instructors e-mailed students the web addresses of the OER introduced in class every week, so students got the ease of reviewing the topics from various types of presentation by surfing through the OER. The statistics of the questionnaire show that students gave positive responses to most OER, and agreed with Anisetti et al.’s study. However, e-learning relies on learners’ self-motivation. Furthermore, some teachers indicated that it was hard to supervise classroom conditions in distance education (Tao & Yeh, 2008). A study indicated that classroom energy depends on the teacher’s enthusiasm (Metcalfe & Game, 2006). In this study, the authors think that listening and questioning makes the learning processes mature. In this point, the computer aided broadcasting classroom combined the two types of learning methods to present advantages in learning.

Because some students may not have the ability to search through the web in English smoothly, it is very important for instructors to give students the correct website addresses of OER. For example, giving the website in the “http://ocw.mit.edu/OcwWeb/Electrical-Engineering-and-Computer-Science/6-003Fall-2003/CourseHome/index.htm” form is absolutely better than just giving the address in “http://ocw.mit.edu/”. Although students should immediately write down the website address in their textbook or lecture notes, the e-mail reminder ensures that web addresses are delivered to students.

Data source: MIT OCW
D. Factor analysis
Using the color plate analysis, our study presents a deeper and clearer decomposition of the factors related to OER aided learning. The color plate is intuitively easy to show the relationships between many factors, and enhances the layout of questions. The factor analysis we proposed has the characteristics of multiple factors combination and hyperlinks for deeper descriptions of the factor.

E. Life-Long Learning
Jiusto & DiBiasio (2006) investigated self-directed learning (SDL), and life-long learning (LLL). The study was executed in the Global Studies Program, Worcester Polytechnic Institute. The results showed that raising interesting issues regarding alternative methods of measuring potential benefit is one of the keys to promote SDL/LLL. The governing system of LLL in Asian countries, such as Japan, Korea, Hong Kong, Singapore, Thailand, and the Philippines, was compared in Han’s (2001) study. Therefore, OER become a very well aided tool for SDL/LLL, because of the convenience of resource access for instructors and learners. A combination of the traditional classroom and computer-aided OER access overcomes the weakness of self-learning and increases the diversity of LLL. This supports the government to modify the strategy of LLL. The importance of e-learning depends on the areas, resources, information infrastructure, etc. of a given country.

Kärger et al. (2008) developed a learning technology for personalization of online learning which is based on learners’ individual goals, preferences, interests, and knowledge, and thus the interaction with the learners can be adapted to their individual needs. The free type of learning is very good for self-learners. LLL is a very wide range of education. Some personalization settings or reading guides for beginners, experienced persons or experts of OER can help self-learners to absorb the knowledge smoothly. The type of learning for regular students might be evaluated because most educators think that common and basic knowledge is the capstone of students’ further development. One of the duties for university educators is to push students learning knowledge well.

F. Educational globalization
Pomales-Carcía et al. (2007) pointed out that an English communication skill is one of the essentials in engineering education. The refined materials of OER help students to get on the content well, and the instructor’s explanation and translation of the English vocabulary enhances the student’s English communicating ability in Science and Engineering (EST). Therefore, OER in English are a good tool to practice the English language, especially for students with self-discipline in
NNESNs. Lu et al. (2004) and Tung et al. (2011) indicated that 1500 frequent appearance words (FAV) fill almost 90% of the vocabulary of the two textbooks of “Computer Organization and Architecture” in electrical engineering. Therefore, it is possible for anyone who has memorized merely 1500 words to read a technological document in a foreign language, using his work experience and logical thinking. Many scholars claim that people intending to improve their command of a foreign language should read newspapers, which give multitudinous materials for reading. It is natural that one will find the most suitable materials to read and expand to other fields. Therefore, keeping the FAV of foreign language in mind is the key to learning a foreign language.

Conclusions

The enhancement and encouragement of utilizing OER can accelerate students’ knowledge communication and the globalizing pace of universities. The presentations of computer graphics on OER website and software can improve students’ conceptual understanding of professional knowledge. Instructors in NNESNs can improve students’ communication skills in English through the use of OER as well. In the same way, students in NESN are able to understand the knowledge and cultures of NNESNs through OER. This study presented the practice of OER integrated teaching in a computer-aided classroom and students gave positive comments in the questionnaire. This integrative teaching may require some changes from students, instructors, and universities. The association of content between OER and the textbook will be one of the most important activities for instructors. Distribution of correct OER website addresses is very important for students. Free blogs on the web may be another useful tool for instructors; they can easily post course material through processes as simple as using Microsoft Word and do not need to spend time for any settings of the server. The application of the conceptual color plate analysis is good in qualitative and quantitative views of different factors such as application of analysis and introduction of presentation.

References


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