Open Educational Resources and Collaborative Technologies for Business Classes

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Abstract

Open educational resources (OER) are seen as means to decrease the cost of higher education and close the educational divide between different society groups. At the same time, studies show that collaborative learning is very beneficial for the students. The effective organization of collaborative learning activities is, however, a complex task that requires both properly structured instructional materials and an appropriate collaboration management system. In this paper we discuss the design and development of a free-to-use software system that stimulates the employment

of OER in the preparation of collaborative learning materials for mobile devices or lab computers. The system is web-based and enables instructors to coordinate the collaborative learning process more effectively. It also collects data for assessment of student attainments and employs mark up and tagging for tracking and rights management. The system focuses on interactions based on gap filling activities and is particularly suitable for learning in small groups, e.g., group learning about case studies in business classes. Observations and comments regarding the use of the system in an operations management course environment are summarized in the end of this work.

Keywords: Open educational resources (OER), Technology support of learning, Business education, Collaborative learning, Educational divide

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Introduction and Literature Review

According to UNESCO (2002), open educational resources – OER are "any type of educational materials that are in the public domain or introduced with an open license." There are already substantial amounts of OER in the form of open books, tutorials, lectures, and whole courses in existence. OER increase the instruction quality and ultimately narrow the knowledge divide. Educational resources need to become available in electronic format, given the digitalization of the present era and the possibility to access them through electronic devices. Also, as stated by the United Nations' Millennium Development Goals and Education for All (United Nations, 2011), educational assets need to be available in the form of OER. This availability is to give learners of any background and status equity of access from anywhere at affordable or even no cost (Ally & Samaka, 2013). In some locations, especially those in developing countries, cost for learning material is high, impeding at times the student's ability to reach a sufficient level of education to improve his or her quality of life (Bhavnani et al., 2008). While the lack of computers to connect to the

internet could be one of the reasons for such a situation, the increasing availability of cheaper mobile devices with wireless connectivity such as smart phones and tablets is changing the situation. Learning materials can be accessed from anywhere, allowing developing countries to skip the stage of the personal computer for education fruition, and instead employ directly wireless mobile technology to access OER stored in digital repositories, send assignments and receive feedback (Ally & Samaka, 2013; Bhavnani et al., 2008; GSMA, 2011).

The broader employment of OER brings the need to identify the concept of open educational practices (OEP), which consist of utilizing the best practices and ethics that help the creation and reutilization of OER itself, giving the learners the chance to be co-authors of such resources and therefore assuming responsibility for the learning process. To reach such a knowledge-building framework, the educational content of OER should be provided in a convenient format, providing accessibility for broad range of people, including those with special needs (Teixeira, A. et al. 2013).

As numerous studies show, OER inspire creativity, promote sharing, and increase efficiency, all motivators to develop a better set of skills by both the learners and the teachers. It has been found that OER have a significant role in transforming the pedagogy itself. Studies conducted by scholars on teacher OER training in humanities settings show that collaboration between teachers was highly influenced and augmented by the exposure to open resources and tools, together with the sharing of best practices in teaching. Such results imply that the participants of the study became more engaged with OER applications in their classes, and more interested in pursuing an innovation in teaching methods and material construction (Petrides et al., 2010). Improved creativity and innovation in the practices of pupils and educators have been noted in other studies, which observed how teachers were inspired to reorganize resources to employ OER enabled instructional designs, and how the learners were able to blend the educational material with social

practices (McAndrew, 2011). Moreover, the familiarity of the teachers with information communications technology (ICT) is allowing for a shared way of creating resources, which take place in a community of educators. Online Communities of Practice are becoming places in which knowledge is not only shared but also created from scratch collaboratively and then infused in OER available to everyone (Tosato & Bodi, 2011).

Dealing with OER efficiency, Fisher et al. (2015) managed to measure the student's course completion and outcome in post-secondary school courses. The results showed a significant difference between students that utilized OER in their courses and students who did not. OER equipped students were in fact able to achieve better outcomes in their assignments. Myazoe and Anderson (2015) focused instead on OER quality in informal learning settings, utilizing an Interaction Equivalency Theorem, stating that the high ability to access online resources and the increasing informal education opportunities represent major changes in education. The results show that in such conditions, quality learning can be obtained even within an informal context, attributable to the heightened ability to access external assets.

In this paper we consider an educational model for technology-enhanced OER that assists collaborative learning. It is based on software developed by us which will be available to use as a free-of-charge online service. This software helps create materials for collaborative learning and orchestrates the process. More specifically, we examined how this model could be applied in business classes and shared our experience.

Studies demonstrate the importance of group learning and its numerous benefits: it helps the students develop a broad range of skills and participate actively in the learning process (Springer et al., 1999; Parker, 1985; Blatchford et al., 2003). Unfortunately, it is not so simple for the instructor to organize students' collaboration effectively for several reasons. One of them is the preparation of effective learning materials (Brine et al., 2006; Turk et al., 2006b) for collaborative activities. Development of such

materials is not an easy task and could be quite time consuming for the instructor. Moreover, in the arsenal of various collaborative activities of a teacher, there are some that work better than others, depending on the teaching goals and the learning tasks of every individual lesson. On the other hand, activities such as information gap tasks, requiring filling blank spots in the text, could be part of almost any collaborative activity and permit the instructor to obtain meaningful and more measurable results and outcomes (Brine et al., 2006).

In our previous research (Kanev et al., 2007a; Barneva et al., 2017), we addressed the topic in relation to the problem of effective collaboration in a face-to-face learning environment. We noticed that sometimes the students are not participating actively in collaborative face-to-face activities if not properly encouraged and guided by specific means.

We therefore proposed a mobile device-based approach in the framework of *Bring Your Own Device* model, in which digitally augmented objects could function as points of attraction to initiate a meaningful collaboration (Gelsomini et al., 2017; Bottoni et al., 2015). Once a connection between the devices and the augmented object is established, the learning process and the related collaborative activities are guided and coordinated by the mobile devices themselves. In our previous research, the activities were based on information gap tasks, in which different parts of the input text were disclosed to each student, so they had to collaborate and share their specific knowledge to solve a task.

The employment of this approach has already contributed to significant advancements in Collaborative Learning Frameworks (CLF), which focus on Collaborative Learning (CL) in the case of dynamic groups where at different stages students work independently, interact with each other in pairs or in small groups and/or collaborate in larger groups with a varying number of participants (Kanev et al., 2009, Kanev et al., 2007b). CL and CLF constitute the foundation of the developed Dynamic Group Environment for Collaborative Learning (DGE/CL) methodology that supports students in making informed and intelligent choices about how, when, and with

whom to collaborate (Gelsomini et al., 2016; Kanev & Kimura, 2011). DGE/CL considers a face-to-face collaborative scenario, in which all students are in the same room, can move freely around and interact with each other, and use digitally enhanced printed materials with direct point-and-click functionality. Dynamic group management is conducted through the CLUSPI technology, which preserves the original touch-and-feel of printed materials while supporting additional features and allows the employment of new, non-traditional paper-based interactions (Brine et al., 2006; Turk et al., 2006a).

During our experiments with CLF, we noted problematic issues emerging at the point when groups/pairs were formed, leading to certain difficulties in collaboration. We observed that some students were not always able to maintain a stable collaborative interaction, either due to their personality or to the limited guidance provided by the framework. During the activity, we have also observed some more fundamental problems with respect to the interaction development that clearly indicated certain lack of basic collaborative skills (Barneva et al., 2017).

This work extends our previous study on technology support for collaborative learning in operations management classes reported at the Business Research Consortium of Western New York in 2018 (Walters et al., 2018). The paper is organized as follows: in the next we explain the project goals. In the following section we outline the benefits of using OER as a basis from which the collaboration materials will be composed. Then we describe our experience implementing the methodology in an Operations Management course, and we conclude with some observations and plans for future research.

Project Goals

In this project, we build upon our previous research on Computer-supported Collaborative Learning (Kanev et al., 2007b; Kanev & Kimura, 2011) where students could, at different stages, execute a task alone,

form pairs to work together, or choose to join a larger group to carry out assignments. For smoother and more optimal collaboration, we further consider the novel approach (Barneva et al., 2017) which is based on digitally enhanced tangible artifacts that could act as points of attraction for the students. However, as indicated in our previous studies, the practical application of such tangible artifacts requires additional experimentation with domain specific educational materials. The focus of our current project is therefore shifted towards the design of such learning materials and the implementation of facilities for automated generation of activity papers that facilitate the organization of the collaboration. More specifically, we propose and discuss the implementation of a novel information gap tasks approach, based on flexible group structuring that accommodates classes of different sizes and utilizes OER with automatically generated sets of texts based on content for the collaborative activities.

The goal is to design and develop an automated system that generates such materials adapting the visual presentation of the OER content to the needs of the collaborative activities of differently sized prearranged groups. All students use essentially the same text, but its different variants incorporate different gap filling task activities to accomplish. While going through the assigned text, students can obtain hints on how to proceed with finding additional information as necessary. In this respect, input texts present not just different visual arrangements, but also different guidance and gaps to fill in. Technically the gaps can be presented as multiple alternatives to select from or just as blank fields to fill in. In the process of accomplishing the assignment each student must pay attention to the global information exchange within the group and verify his/her own input with the variants that contain the relevant information.

We have, therefore, constructed an experimental software system that provides the needed support for automating the generation of multiple variants for gap filling activities employing OER. The system is web-based, and thus easily accessible from different locations, and

incorporates text processing and organization functionalities for a proper visual presentation and implementation of the collaborative tasks. This system is in the foundation of our framework for conducting experiments through automatically generated collaborative materials utilizing gap filling activities. It allows the students to access online versions of the collaborative materials through their mobile devices that refresh automatically to reflect the changes made by the group members. Such a mobile digital support enables the collaborative task participants to benefit from a shared view of a constantly updated digital document while its tangible variants are provided as printouts on traditional paper with different gaps to fill in. Note that if a gap filling task is carried out via the online interface, the instructor could better track the student interactions and monitor the corresponding answer sequences for each group through the logging facilities of the system. In this way, an overall view of the class behavior is made available to the instructor at all times during the exercise which allows for thorough analysis of student behavior and more adequate feedback. As an illustration, we have employed the system to conduct experiments in a business course of Operations Management, which we discuss below. The experiments demonstrated the usefulness of the system for preparing class assignments that stimulate collaboration.

The developed software system is structured as functional modules and scripts implemented in Java, Tcl, PHP, and JavaScript installed on a local web server for the experiments. Public access to the system will be initiated after its installation on a more performant web server with a high-speed link to the Internet. In this way end users will access the system as a web service with no need to install the software and maintain their own web servers.

This software can be used for automated creation of gap filling educational content utilizing different source materials. If the original source content is copyrighted, however, appropriate permission from the copyright holders must be obtained in advance. As authors usually retain the rights for content reuse and creation of derivative materials, instructors

can use their own published content in their courses and derive new content through the automated system practically with no restrictions. However, the copyright owners must still grant appropriate permissions to extend the use of the generated materials to courses delivered by other instructors. Such rights management with respect to the automated system input and output content might indeed be quite complicated and time consuming. Our efforts for streamlining this process by taking advantage of the OER model are outlined in the following sections.

Open Educational Resources

The public space offers myriad free resources in the form of articles, charts, photographs, maps, slideshows, data, blogs, talks, videos, tutorials, software, educational games, and whole courses. However, as most of those sources are copyrighted, they cannot be freely modified and thus adapted, for example, to the needs of the collaborative learning model described above. The Creative Commons (CC) licensing initiative, launched in 2002, the same year when the OER term was coined, addressed this issue by establishing mandatory copyright retention, obligatory copyright crediting, and a streamlined licensing process. In result, most of the OER materials nowadays are covered by CC licenses. The copyright of any material under CC is retained by its creator who permits others to use it in accordance with the specific CC license terms and conditions. The standard types of CC licenses are as follows:

Citation Information

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