Chapter 23
Improve Collaboration Skills Using Cyber-Enabled Learning Environment

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ABSTRACT

Collaborative learning methods have been widely applied in online learning environments to increase the effectiveness of the STEM programs. However, simply grouping students and assigning them projects and homework does not guarantee that they will get effective learning outcomes and improve their collaboration skills. This chapter shows that students can improve their learning outcomes and non-technical skills (e.g. collaboration and communication skills) through the cyber-enabled learning environment. The data was collected mainly from software engineering and object-oriented design classes of both graduates and undergraduates. The authors apply a blended version of education techniques by taking advantage of online environment and classroom teaching. Based on the study, the authors show that students can improve their collaboration and communication skills as well as other learning outcomes through the blended version of learning environment.

INTRODUCTION

Collaborative learning methods have been widely applied in online learning environment to increase the effectiveness of STEM programs. However, purely application of the online learning environment may not work well for students to improve both technical and non-technical skills (such as collaboration and communication skills). First, simply grouping students and assigning projects and homework do not guarantee that they will get effective learning outcome. Second, existing instructor-centered learning environment in many online courses does not offer sufficient scope

DOI: 10.4018/978-1-4666-5800-4.ch023

for students to work collaboratively. To prepare students for their future information technology careers, it is necessary to foster collaboration and communication skills that are needed in the industry.

In addition, it is widely noticed that software engineering professionals working in industry are generally unsatisfied with the level of real-world preparedness possessed by recent university graduates entering the workforce (Cummings & Betsy, 2007; Callahan & Pedigo, 2002). Their frustration is understandable – in order for these graduates to be productive in an industrial setting, organizations that hire them must supplement their university education with extensive on-the-job training and preparation that provide them with the skills and knowledge they lack (Conn, 2002). The root of the problem seems to lie in the way software engineering is typically taught: theories and concepts are presented in a series of lectures, and students are required to complete a small, toy project in an attempt to put this newfound knowledge into practice. Thus, the student graduated has little demonstrated capability in solving problems of large scale systems or dealing with critical issues and is lack of adequate skills of collaboration, communication in the teamwork environment.

Having observed similar situations in Alabama A&M University in the past years, we have developed a framework using the blackboard learning system to encourage students to engage with online activities. This framework is intentionally designed to support student online activity so that they could actively interact with teaching content and collaborate and communicate with others. Another feature of this methodology is the development of reusable learning objects. A learning object is a learning unit that contains an objective, a learning activity and assessment, which represent a set of reusable and self-contained digital resources. The baseline data collection in software engineering course at Alabama A&M University started in Spring 2008. The framework has been applied and validated since 2010 and has been improved in 2012. The measurement of the method was done in several ways – a pre-test and post-semester survey, a student interview, an alumni survey. The data was analyzed based on the satisfaction rate regarding to the course objectives. The survey questions are grouped by four categories regarding to the course objectives and program goals: background (including majors, minors, working experience), programming skills, project topics (information systems, embedded systems, security, government project, industrial project), and difficulty level (ranking from 1 to 5). In this chapter, we focus our analysis of the questions that are related to collaboration and communication skills.

In order to provide a meaningful context for students to learn and work collaboratively, this study is conducted in the software engineering and object oriented programming courses. We updated the current technology-based learning strategy as the background theory that supports this framework. Technology based teaching strategies utilizing Internet technology could provide remarkable educational opportunities for the 21st century learners. In our study, the upgraded technology-based learning (UTBL) includes communication devices other than just Internet based teaching. The communication devices used in this framework are robots, mobile devices (such as Android tablets, iPhone), social media and networks. These devices can be used for demo, example and project implementation, group discussion and peer communication during and after classroom time. Through synthesizing cyber enabled learning environment with technology-based teaching, the framework can dramatically motivate students and improve their learning outcomes.