Chapter 6

Use of Collaborative Technologies in Engineering Education

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ABSTRACT

The purpose of this chapter is to explain the collaborative problem-solving approach and collaborative technologies that help engineering students to establish and improve collaboration in their coursework. To this end, the theoretical background of collaboration in education and the importance of the learning environments are discussed. Possible effects of a constructivist learning environment on engineering students’ educational output are explained. Following that, the collaborative problem-solving approach and collaborative technologies are presented. Then, the collaborative problem-solving method framework and how collaborative technologies can be used with this method in the learning environment of engineering education are explained in detail. Finally, recommendations about future work are presented.

INTRODUCTION

In every context of education, students’ meaningful engagement with sound academic activities improves their educational outcomes such as persistence with the school,
academic achievement, completing the enrolled program, and personal development (Carini, Kuh, & Klein, 2006). Engineering education is not an exception (Ohland, Sheppard, Lichtenstein, Eris, Chachra & Layton, 2008). The level of student engagement and student success with the engineering education programs also affect schools’ reputation and investment plans, therefore it is important to increase the students’ involvement with the school and their success with staying in school and completing the degree (Chen, Lattuca, & Hamilton, 2008). Since engineering education is a tertiary education level, it is important to recognize Tinto’s (1987) and Astin’s (1993) works on student involvement and engagement with academic activities in higher education.

Tinto (1987) developed a model for factors affecting students’ decision to drop out of college, which is called the institutional departure model. The purpose of the model is to explain how factors affect and interact with students’ decisions on whether to complete or depart from higher education. As shown in Figure 1, five major factors impact this decision, one of which is institutional experience and others are personal traits. Institutional experience is the only factor that allows faculty, administrator, and policymakers to implement in learning environments for improvement in students’ experiences with higher education. Peer interactions, faculty/staff interactions, and extracurricular activities help students to have positive experiences with higher education.

Figure 1. Tinto’s Model of Institutional Departure (Tinto, 1993)
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