Chapter 9
Motivation on Problem Based Learning

Javier Carmona-Murillo
University of Extremadura, Spain

Juan F. Valenzuela-Valdés
University of Extremadura, Spain

ABSTRACT

In order to motivate the students in a Problem Based Learning environment, two different strategies are analyzed. The first one consists in introducing two crosscutting issues such as the ecology and the study of patents. In that strategy, the students need to solve the activities taking in account this "green component" to obtain the best solution as well as the study of patents (which is the process to patent something), that engineers need to know to develop their professional career. The second strategy is to analyze the motivation of students when PBL is combined with different instructional methods, different objectives and in different courses. In order to do this analysis, we have implemented different practices that includes both e-learning and m-learning. Finally, we analyze the motivation during our PBL courses through a survey. This analysis has been done in three different subjects in a Telematics engineering degree at University of Extremadura, Spain.

INTRODUCTION

The new context of the European Area for Higher Education (García-García et al., 2009) and the current social environment marked by new technologies imply that new Telecommunication Engineers must be trained not only in technical knowledge but also in the professional skills that they must use in their professional life (Cajander & Daniels, 2011). The effectiveness of hands-on experience to produce meaningful learning has been clearly demonstrated, for example (Gil et al., 2010), (Martínez et al., 2012), indicating the need to train university students in specific professional skills. Over the last few years the ABET engineering criteria (ABET, 2013) have served as a guideline to develop professional skills in order to achieve this. In Problem-based learning (De los Ríos et al., 2010) (Kartal & Bakaç, 2010), students are confronted with an open-ended, ill-structured, authentic (real-world) problem, whereas Project-based learning begins with an

DOI: 10.4018/978-1-4666-8803-2.ch009

assignment that must lead to the production of a final product—a design, a model, a device or a computer simulation. The former method is always active and collaborative and, typically, involves significant amounts of self-directed learning on the part of the students.

This methodology, PBL, as a teaching strategy and curricular design began at the McMaster University School of Medicine in Canada in 1969. Using problems based on actual clinical cases as focal points in a medical program evolved after years of medical faculty and student frustration with the traditional lectures and challenging clinical experiences. Imparting and absorbing the immense amount of content inherent in a medical education was becoming more unrealistic and improbable. Drawing from the tutorial process developed by Barrows (Barrows, 1985), (Barrows, 1988), (Barrows, 1971), (Barrows, 1980), (Barrows, 1996) the medical curriculum shifted from a faculty-centered approach to a student-centered, interdisciplinary process. Starting from this initial learning strategy, many schools in different parts of the world have adopted this methodology usually with some variations to suit their local needs. However, the spread of the methodology was not homogenous all over the world. Whereas in North America the impact of PBL was very strong, due to the long academic traditions of American colleges and universities with their focus on personal development of students, the inclusion of PBL in Europe was very different.

The first European PBL curriculum was introduced in 1974 in the University of Maastricht (The Netherlands) Medical School. This medical school was founded in that year, with the explicit mission to explore innovative forms of teaching and they implemented the PBL as the main learning strategy in their courses. Today, PBL is widely spread in different fields of higher education. A complete review of the works done with PBL in the first 25 years of the methodology can be found in (Albanese & Mitchell, 1993), (Norman & Schmidt, 1992), (Mohd-Yusof et al., 2011).

Despite the long time from the initial development of the methodology, more than forty years, the inclusion of PBL at universities is growing yet. Nowadays, the PBL is complemented with the new learning methods, such as cooperative learning, on-line learning or e-learning and mobile-based learning or m-learning. For example, the cooperative learning refers to a set of instructional strategies in which students work together in small groups to help each other learn academic content. This kind of learning improve the teamwork skill and develop some social skills, some capabilities key in the 21st century engineer profile. The benefits of this combination are defined in (Salaberry et al., 2005), where the authors indicate that "Combining PBL with cooperative learning provides a mechanism for students to maximize their own and other group members' learning by working in teams to accomplish a common task or goal". Other implementations of cooperative PBL can be found in (Maskell & Grabau, 1998), (Miao & Haake, 2001). Another example of the integration of PBL with other learning methodologies is the appearance of PBL in virtual learning environments (Quesada, et al., 2013) (Ching-Pu et al., 2011) (Yajie et al., 2010) (Ali & Samaka, 2013) (Secundo et al., 2007) (García-Robles et al., 2009) (Schmidt, 1983).

As we have stated previously, the methodology problem based learning increasing its popularity day by day. Nowadays a lot of Universities implement this methodology. We have implemented this methodology in several courses (Lozano-Guerrero & Valenzuela-Valdés, 2014), (Valenzuela-Valdés et al., 2014), (Carmona-Murillo et al., 2014). This methodology is easy combinable with other methodologies as e-learning or m-learning. Thus, PBL is very flexible methodologies that permit us implement several innovations, moreover this methodology has been used by other authors to implements several innovations as:

- PBL used in order to provide different skill. It is necessary to train university stu-