Introducing Problem Based Learning (PBL) in Textile Engineering Education and Assessing its Influence on Six Sigma Project Implementation

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ABSTRACT

The purpose of this paper is to explore the methodology that has adopted to implement PBL in textile engineering education at “Lucian Blaga” University of Sibiu (LBUS) which also highlights its potential influence on Six Sigma projects that has implemented in a textile manufacturing industry. The function of both PBL and Six Sigma approaches is to solve the problems by executing projects in a systematic way. Structurally, they are quite similar in nature. Many academic institutes around the world are currently introducing PBL to enhance the quality of higher education. On the other hand manufacturing units are trying to shorten their Six Sigma project duration, but interconnection between both issues is not always evident or addressed. Therefore, this study contributes to effective utilization of PBL in implementing Six Sigma projects. In this paper, at first PBL has been introduced in the textile engineering education through a collaborative project with a textile factory, where Six Sigma projects have also been executed simultaneously. The PBL team has contributed to the Six Sigma project team to solve the problem in factory premises. Finally, the students’ performance and the contributing effect of PBL activities to Six Sigma project have been assessed by conducting quantitative survey method containing structured questionnaires. The survey results revealed that the students’ performance has been upgraded through PBL activities. The PBL also showed a positive impact on executing Six Sigma project successfully and able to shorten the project duration. This paper has pointed out the necessity of introducing PBL to enhance the quality of textile engineering education as well as unifying PBL with Six Sigma approach for effective project execution within the Organization.

Keywords: “Lucian Blaga” University of Sibiu (LBUS), Problem-Based Learning (PBL), Self-Directed Learning, Six Sigma Project, Teamwork, Textile Engineering

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INTRODUCTION

Problem based and project based learning (PBL), also called real life problem based learning, is a well-establish pedagogical method in different domain of the studies around the world. The students are working in a team and learning themselves by solving subject related problems in this method. PBL history has revealed that at first it has been implemented in the medicine and law education but for the course of time it has spread its application to various fields of education like natural sciences, social sciences and applied sciences etc. (Maria, 2010). A large number of publications have found regarding successful implementation of PBL in engineering education in different countries throughout the world (Du, de Graaff, and Kolmos, 2009).

Like other domains of engineering education, some examples have also been found in the area of textile engineering education. For instance, in the University of Manchester (Sayer et al., 2006), in the University of Minnesota (Bye, 2011) and, in Illinois State University (Gam and Banning, 2011).

In order to highlight the necessity of PBL implementation in textile engineering education, Mills and Treagust’s (2003, p.2) stated the followings:

In recent years studies have been conducted in many countries to determine the technical and personal abilities required of engineers by today’s industry. These studies have indicated some key concerns. Today’s engineering graduates need to have strong communication and teamwork skills, but they don’t. They need to have a broader perspective of the issues that concern their profession such as social, environmental and economic issues, but they haven’t. Finally they are graduating with good knowledge of fundamental engineering science, digital and computer literacy, but they don’t know how to apply that in practice.

PBL is one of the most influential pedagogical methods which can give all possible efforts to facilitate the engineering education by creating institutional profiles, emphasizing students’ learning and motivation, achieving new competences, enhancing the quality of education, decreasing dropout rates, better duration rates, and better collaboration with industry (Kolmos et. al, 2009).

PBL provides an opportunity for students to be self-directed life-long learner which is mandatory for equipping engineering students with the skill and knowledge (Baral et al., 2012). According to de Graaff and Kolmos (2003, p.658):

PBL is a real life problem oriented learning method, which will be solved by conducting a project. Through these activities students will achieve the competences which will be helpful for their professional life.

On the other hand Six Sigma, as a quality management approach, systematical and structured improvement procedures provides teams a methodological framework to guide them in the conduct of improvement projects (Pande et al., 2002). That means the function of both PBL and Six Sigma approaches are quite similar in nature: to solve the problems by executing projects in a systematic way.

In this research, at first PBL has been introduced in the textile engineering education at “Lucian Blaga” University of Sibiu (LBUS) through a collaborative project with a textile factory, where Six Sigma projects have also been executed simultaneously. The PBL team has contributed to the Six Sigma project team to solve the problem in factory premises. Finally, the students’ performance and the contributing effect of PBL activities to Six Sigma project have been assessed by conducting quantitative survey method containing structured questionnaires.

BACKGROUND

“Innovative thinking is very much essential for engineering students to upgrade their performance in working place”- concluded the business representatives in the discussion session called “Business meets Academia” during
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