

# Evaluating Engineering Students' Perceptions: The Impact of Team-Based Learning Practices in Engineering Education

Sivachandran Chandrasekaran, Deakin University, Waurin Ponds, Australia

Binali Silva, Deakin University, Highton, Australia

Arun Patil, Deakin University, Geelong, Australia

Aman Maung Than Oo, Deakin University, Waurin Ponds, Australia

Malcolm Campbell, Deakin University, Geelong, Australia

## ABSTRACT

The focus of this research study is to evaluate engineering graduates' performance on team-based learning practices in engineering education course. Team based learning (TBL) is an effective approach, which emphasizes active learning in a collaborative task. In an engineering curriculum, students are encouraged to develop skills around TBL that helps to enhance graduate employability opportunities. This paper presents an exploratory analysis of evaluating engineering graduates' performance in practising TBL at a postgraduate study level. The cohort of students that participated in this study were primarily postgraduate engineering students at Deakin University.

## KEYWORDS

Collaborative Learning, Engineering Education, Graduate Skills, Team-Based Learning Practices

## INTRODUCTION

Team-Based Learning (TBL) is an effective approach of an engineering education that involves cooperative interactions among students aiming to achieve a common set of goals. When TBL is implemented correctly, it helps students to enhance social and intellectual aptitudes in a curriculum environment (Jeffries & Huggett, 2010). Team-based learning has been a primary focus in a wide range of academic fields, such as engineering, medicine, law and psychology (Haberyan, 2007; Sparrow & McCabe, 2012; Thompson et al., 2007; Thorley, Gregory, & Gregory, 1994). TBL in engineering education is crucial to overcome persistent hurdles that students often encounter during the course of study. In spite of possessing comprehensive engineering literacy, one of the main issues faced by engineering students is the limited competency to apply knowledge in relevant engineering context. Teaching content which is primarily focused on technical work inhibits students in integrating

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practical applications and learning socio-economic, environmental and legislative concerns in present engineering practice (Mills & Treagust, 2003).

The previous literatures indicate that team-based learning has influenced both project-based learning and problem based learning in engineering education. A relative discussion by Jullie Mills, David Treagust and Yan Zhuge reveals that the involvement of TBL in project-based learning and problem-based learning were primarily focused on students working in small groups, undertaking projects in various engineering disciplines (Mills & Treagust, 2003; Zhuge & Mills, 2010). Those practices signify that a certain extent of TBL is required in both project-based learning and problem-based learning approaches. Ongoing research focuses on implementing TBL in various stages of educational practice including primary, secondary and tertiary education. Tertiary education has obtained a great range of attention towards TBL, mainly due to the rising demand of “human-interactive” skills of graduates required by employers (Dwyer, Coonan, Leitch, Hetzel, & Baghurst, 1983; Mullis, 1997; Rigby, 2002). The focus of this study is to determine the impact of team-based learning practices in the perceptions of engineering students.

### **Team-Based Learning Principles**

TBL approach operates in a rhythmic manner involving four basic principles such as team development, team responsibility, team assessment and assessment feedback. It is important to identify these principles in order to understand the relation of each, towards effective learning strategies amongst students in various learning groups. The principles also aid the transformation of a small group of students into a high-performance learning team. Team-based learning is initiated with the formation of a group of individuals who are provided with separate responsibilities pertaining to a common task. Team development and team responsibilities are the sole responsibilities of the team members, whereas the teachers carry out the assessments and feedbacks. The four principles pertaining to team-based learning are discussed below.

#### ***Team Development***

An effective team development focuses on neglecting prior conflicts amongst acquainted team members and ensuring that student teams are formed solely through a group formation instigated by the teacher (Michaelson, Knight, & Fink, 2002). Adequate time is often required for students to settle within the team through the process of team development and responsibility circulation. In occasions where groups are required to be reformed, the team development process must be repeated, once again with allowable time for team comfort. However, it is worthwhile to avoid team disruption in order to maintain cohesiveness between the team members. An effective approach includes generating a random allocation of students based on student identification numbers or acronyms of student names. This enables the development of a cohesive team in spite of student relationships and cultural diversities, which is the precise scenario encountered in a workforce.

#### ***Team Responsibility***

In comparison to traditional teaching approaches involving student accountability by a teacher, TBL requires students to be accountable for each team member responsibility in a manner which credits or discredits an individual behaviour and contribution. It is critical in order to target an effective team contribution, comprehensive class groundwork and a high-quality team performance (Michaelson et al., 2002). It is in turn followed by a clear-cut and rational grading system which will reward and inspire a student behaviour ideal to improve team interaction and learning.

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