Full Paper

Introduction

The emergence of knowledge society brings in new characteristics of knowledge construction and learning process – technology-bounded, multi-dimensional, unstable, innovative, collaborative and complex. Professional competences and expertise become progressively more difficult to identify when problems are becoming increasingly ill-defined and across-disciplinary with involving a growth of various integrated issues like technology, environment, economy, culture, sustainability and society. This gives rise to challenges to universities, in particular, engineering universities, which traditionally have been playing a role of dissimilating technical discipline focused and stable knowledge based on individual learning.

Questions have been posed to universities in the globalized society: How to help students gain contextualized knowledge and competencies which are connected with relevant cultural and collaborative environment instead of merely learning generalized knowledge and fixed skills? How to prepare students for their professional life with sufficient readiness to solve the complex and ever-emerging new problems collaboratively and innovatively? In many instances educational research report that traditional classroom based and lecture centred education has not always successfully produced satisfactory answers to these questions or even addressed these issues. Therefore, it is essential for engineering education to innovate its pedagogical theory and methods.

Project Based Learning (PBL) has been well identified as an innovative pedagogy in engineering education. PBL has been employed as educational philosophy and methods to provide the possibility for students to achieve interdisciplinary, sustainable, transferable skills, while at the same time exposing them to the complexities of global and cultural issues. In late 1960s and early 1970s, PBL started from being an alternative of lecture based pedagogy, which focuses on improving teaching and learning. In the past two decades, it went through a developing process with including a broad variation in terms of across contexts and across discipline based PBL. High diversity can be observed at the current stage where aspects of sustainability and culture become essential.

This paper looks at how project based learning as a pedagogical method can improve students' graduate attributes through personal development and early feedback. The study was performed in order to understand what students think about personal development in the form of self-study, and understand what activities would be most appropriate in order to improve the graduate attributes.

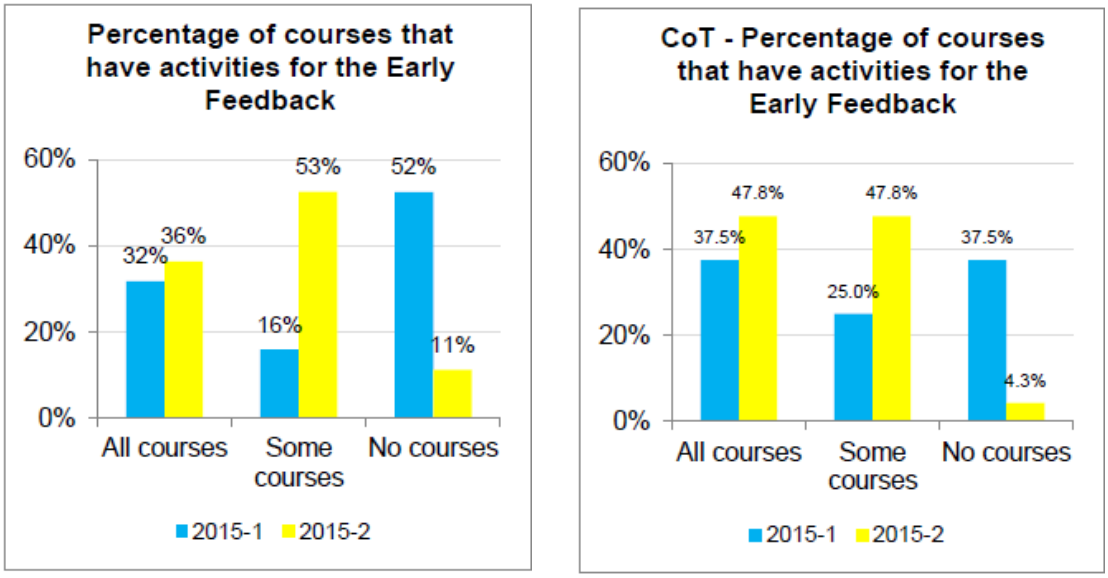
Personal Development

RMIT University Vietnam initiated two steps in 2015 to help improve student-learning outcomes; these included the process of giving early feedback to students in week 4 of the semester and student personal development in week 7. The goal of these two activities is to help students develop and improve the graduate attributes. The graduate attributes are as listed below.

a. Work Ready
b. Global in outlook and competence
c. Environmentally aware and responsible
d. Culturally and socially aware
e. Active and lifelong learners
f. Innovative

These activities were introduced for the first time in 2015 and a university wide student survey was conducted to understand the impact of these activities and to gather student views on the early feedback and the student personal development activities. Students were enquired on their perceptions of the activities and the quality of the activities. The Centre of Technology at RMIT University Vietnam has decided to look at these results closely and address the issues highlighted in this survey.

Figure 1a shows the percentage of courses in the unviersity which early feedback actvities were conducted and 1b shows the courses in the Centre of Technology.



(a) (b)

Figure 1 a & b: The percentage of courses in which had early feedback activities university wide and in the centre of technology in 2015

The student response has grown positively with 36% agreeing university wide in 2015 semester 2 that all courses had an early feedback activity and the Centre of Technology performed better than the university average with 47.8% students agreeing there were early feedback activities in all the courses. There is still a concern with 11% of students university wide and 4.3% students in the Centre of Technology pointing out there were no early feedback activities conducted in any courses they studied in semester 2 2015 though this is a significant improvement from semester 1 2015.

The goal of the early feedback activity is for students to receive feedback on their progress in the course they are studying early in the semester so they can improve on their performance later in the semester. Figure 2 shows the responses from the students of the Centre of Technology of how they received their feedback. The students early in the year in semester 1 only received primarily verbal feedback from staff, which has reversed in semester 2 with students receiving more written feedback from staff.

Verbal feedback can be effective but written comments help students to focus their attention and work on the areas needing improvement. The activity also shows a lower percentage in the use of an online quiz/test to provide early feedback which is a positive sign. There is a small percentage of peer feedback for students but only in semester 2 of 2015.

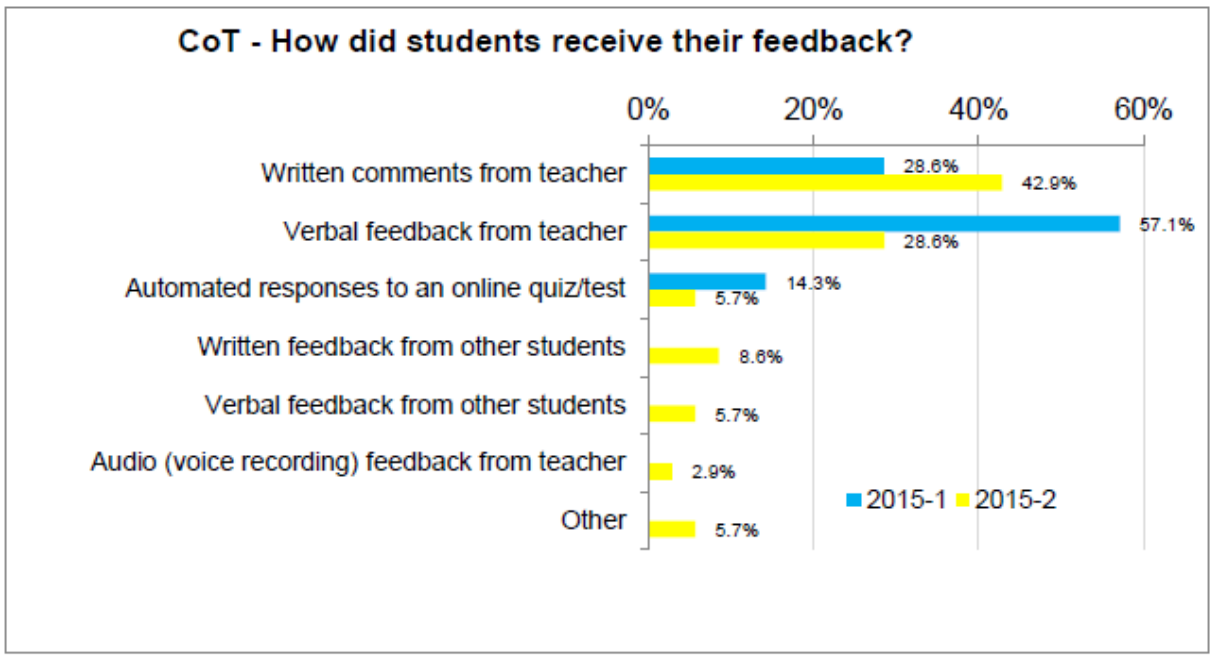


Figure 2: Student responses on how they received feedback

Students were asked about their views on the early feedback and the activities provided. Nearly all students (91% semester 2 and 100% semester 1) were aware and informed of the early feedback activity in the course. This is shown in figure 3.

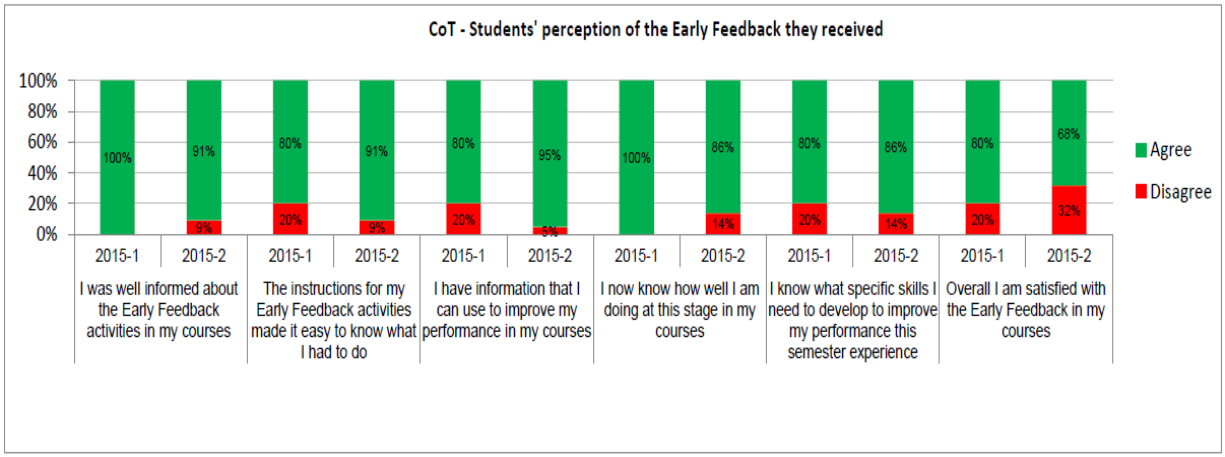


Figure 3: Student perceptions of the early feedback received

Majority of the students also agreed they received instructions which made the activity for early feedback easy to understand. They also agree that they had information that can be used to improve their performance in the courses. Despite this, 32% of the students are not satisfied with the early feedback given and 14% students don't know what specific skills they need to develop to improve their performance in the semester the feedback is given. Along with the early feedback, students were also asked about their perceptions on the personal development week held in week 7. The purpose of personal development week is to get students to work self-directed in order to develop some of the key graduate attributes.

When students were asked what activities they undertook as part of the personal development week, large majority of students were asked to continue work on an assignment or project, complete practice exercises or review the topic covered in the previous 6 weeks. This is shown in figure 4.

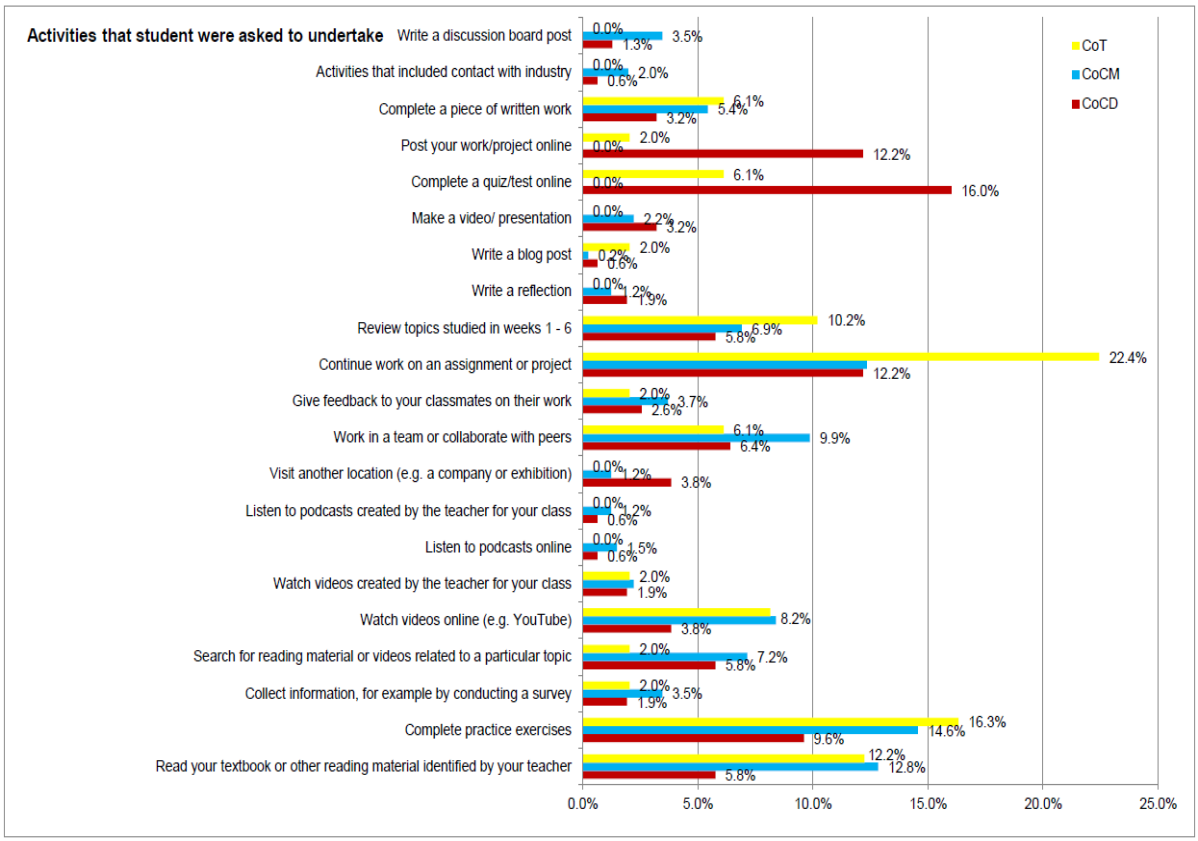


Figure 4: Activities students undertook during the personal development week

The activities are not aligned with the purpose of developing the graduate attributes. When students were asked if they have achieved the outcomes, 36% of the students said they couldn't achieve the outcomes for the personal development week as they weren't accustomed to independent learning or didn't want to undertake independent study as shown in figure 5.

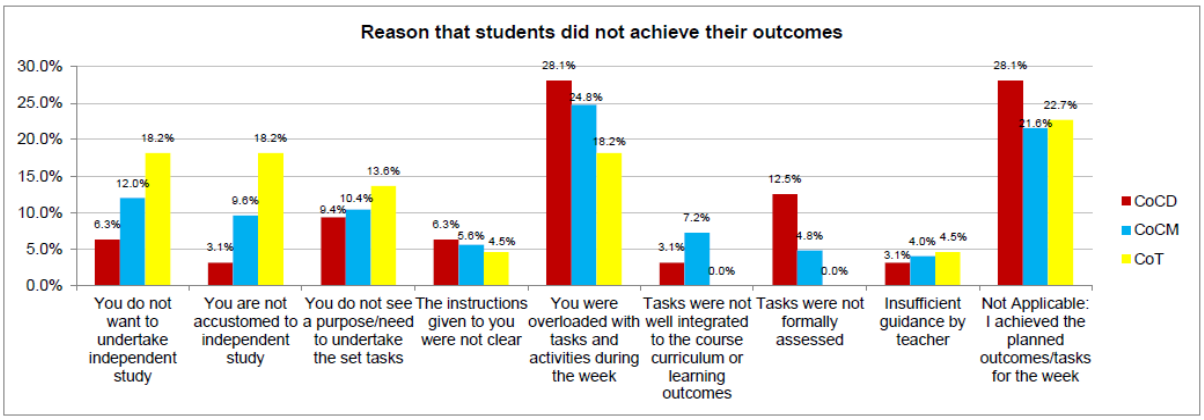


Figure 5: Reasons that student did not achieve their outcomes

Another reason students weren't able to achieve the outcomes was due to the fact that students were overloaded with tasks and activities during the personal development week. Students views on the personal development week were sought, and 60% of Centre of Technology students said it was organising your own time, 47% believed it to be working to overcome challenges as shown in figure 6. Another 57% said it was a time to understand the course material and only 43% believed it to be a reflection on their own performance.

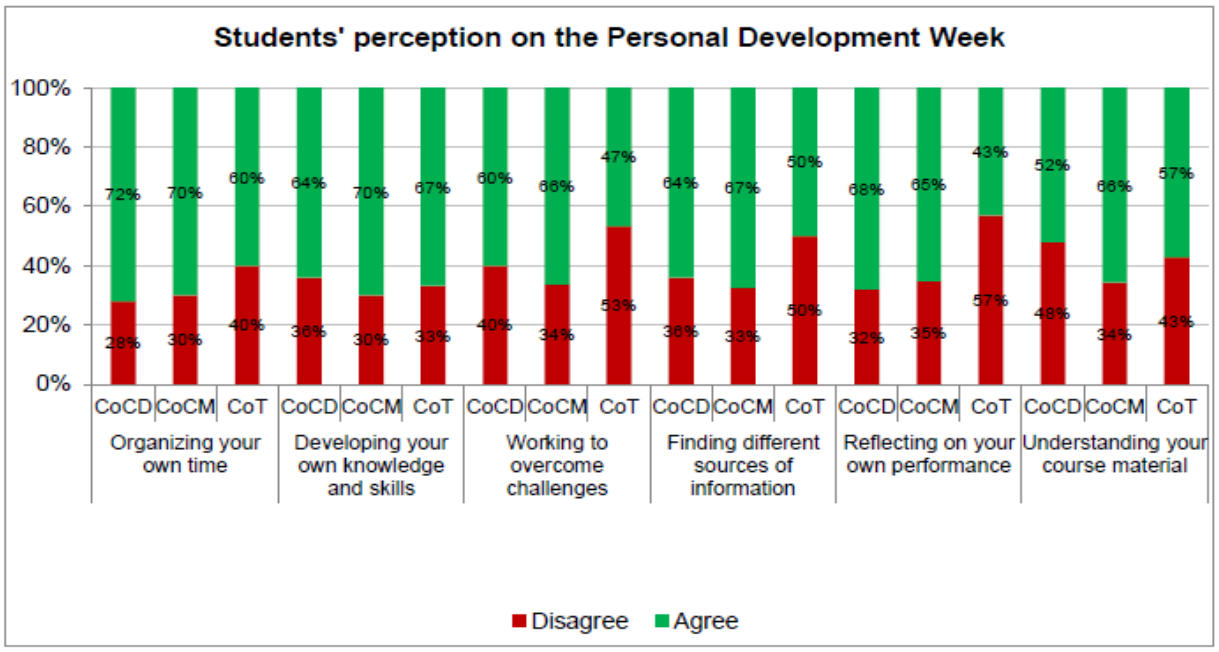


Figure 6: Student perceptions on the Personal Development Week

Project Based Learning: A method to improve graduate attributes

Problem and Project based learning (PBL) as a pedagogical teaching and learning method has been actively applied for many years. One of the first applications of PBL is recorded in the study of medicine in the 1960s (Barrows 1985; Barrows 1996). Since then PBL has spread in other higher education disciplines such as engineering, mathematics, business, and architecture. Project-based learning is generally regarded as an innovative method for engineering education (Graaff & Kolmos 2003). The success of this method is dependant on the learning principles which the method possesses. When compared to traditional lecture-based or teacher-entered engineering curriculum, the PBL model appears to inspire a higher degree of involvement in study activity (Graaff & Kolmos 2003). The definition of PBL is still somewhat open and designing a PBL curriculum is dependent on the objectives of an institution.

The hypothesis of project-based learning is that learning begins by dealing with problems, which occur from professional training (Gijselaers 1996).

Traditionally, education within the Centre of Technology at RMIT University Vietnam has been structured according to the logic of separate courses. However, because professional training and individual learning practices do not pursue such dissection, this has led to an amplified gap between professional engineering training and education (Boud 1985; Boud & Feletti 1991). The conversion of the Engineering programs to the Project-Based Learning (PBL) paradigm fundamentally enhances the relationship between the program and current University practices, by incorporating cross-departmental and cross-campus co-operation within the fabric of the program design, as well as the program delivery. This transforms the nature of the involvement of academic staff from one of “service provider” to one of “team member” or “co-owner” of the programs.

The PBL Model in the Centre of Technology

Over the past one year, the Centre of Technology has been working towards its own approach to project-based learning (PBL), an approach that reflects our students and our setting.

This approach is guided by the principles of practical learning, problem solving, teamwork, design thinking, innovation, and creative thinking. To achieve real-world projects learning, the principles are well aligned with internal and external expectations including academic, industrial, and professional accreditation expectations. This is shown in figure 7 below.

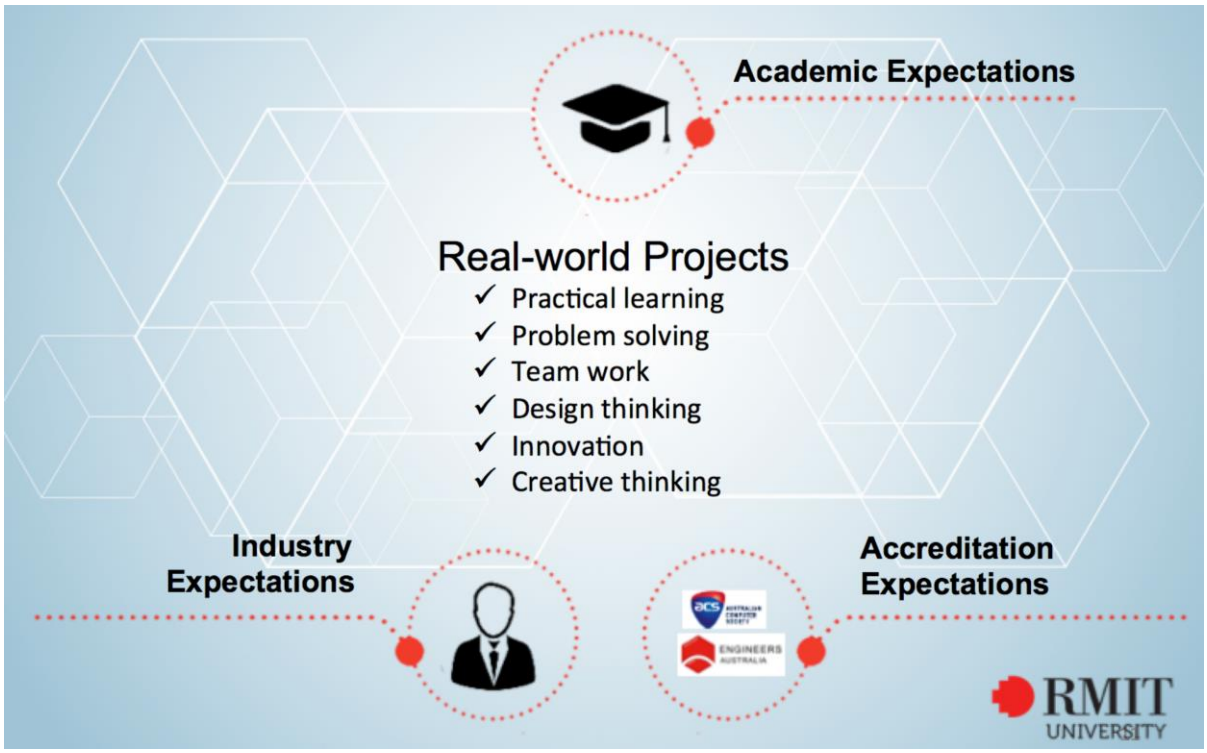


Figure 7: Learning principles and expectations

Conclusion

The global requirements for innovation give rise to challenges and new tasks to engineering universities. Engineers today are expected to master a combination of disparate capabilities, not only technical competencies concerning problem solving, technological production and innovation, but also interdisciplinary skills of cooperation, communication, management and life long learning abilities.

The paper looked at how project based learning as a pedagogical method can improve students' graduate attributes through personal development and early feedback. The study was performed in order to understand what students think about personal development in the form of self-study, and understand what activities would be most appropriate in order to improve the graduate attributes.

The overall results indicate that in order to achieve alignment of learning tasks to learning outcomes and therefore improve graduate attributes, the student's activities must be focused and well designed. A proposed learning method, which could achieve this, is project-based learning.

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