



An investigation into problem-based learning in teaching telecommunications

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BACKGROUND

It is well-known that the lecture, tutorial and laboratory format has been prevalent in teaching telecommunications subjects in many accredited engineering programs at Australian universities. This method of teaching is resource-intensive in terms of instructor hours and it is lecturer-centric. Driven by the need to improve the efficiency of subject delivery, improved student engagement and enhanced learning outcomes there is a need to investigate new ways of helping students understand the fundamentals and current issues of telecommunications in a way that engages them to reach modern curriculum and assessment standards. Ahlfeldt, Mehta and Sellnow (2005) stated that "Students participate more in a classroom and also report a better understanding of course concepts when steps are taken to actively engage them." It was shown that a higher engagement can be achieved in higher-level classes and also those classes with fewer students. One of the curricular models capable of developing the desired attributes in new engineers and proven to develop expertise in students is PBL (Sheppard, Macatangay, Colby, & Sullivan, 2011). Project work and PBL are often combined to achieve unit learning outcomes (Kolmos, 1996).

PURPOSE

This research investigates the effectiveness of problem-based learning (PBL), in addition to traditional tutorials, in helping students engage with contemporary issues and achieve better learning outcomes in telecommunications subjects within an engineering curriculum.

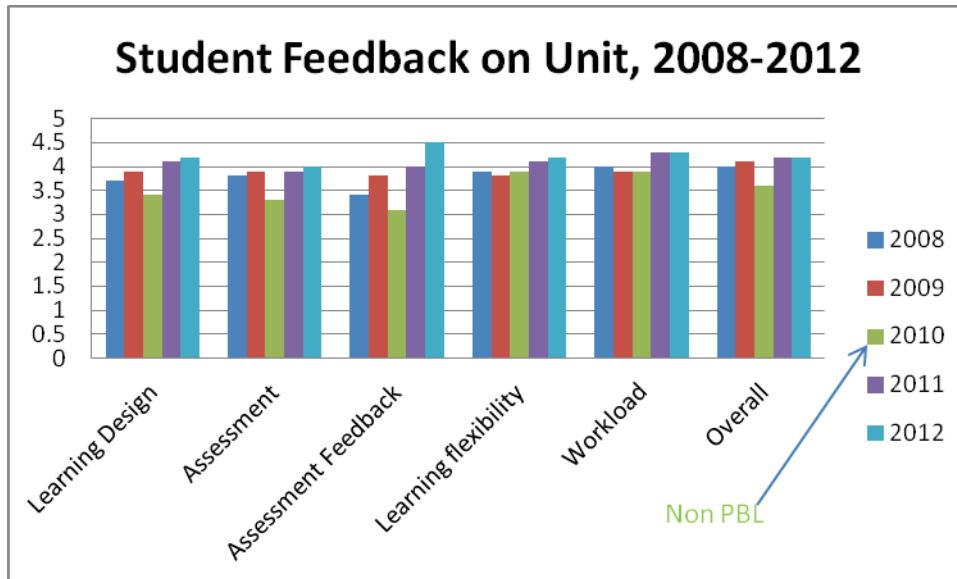
DESIGN/METHOD

PBL was introduced to a third-year (Level 4) telecommunications unit within an accredited engineering curriculum. Student feedback on units performed at the end of each semester is used to evaluate the effect of the introduction of PBL sessions in addition to traditional tutorial sessions. Student evaluations performed with and without PBL over a five-year period are used to measure the success of the method in achieving student engagement and meeting learning outcomes.

INTERIM FINDINGS

It was found that student evaluations of unit increased when PBL is included in a traditional telecommunications unit. The PBL sessions consisted of small groups of students working on a contemporary issue in telecommunications. For example in 2012 they considered the congestion in radio frequency bands and overcoming same by replacing analogue TV channels with digital channels and the ensuing restacking issues.

The following survey items relevant to PBL were considered in assessing the success of teaching and learning: Learning design (The learning activities in this unit have helped my learning), Unit assessment (The assessment activities in this unit have helped me to learn), Assessment feedback (I was able to learn from feedback I received in this unit), Learning flexibility (The unit provided a reasonable amount of flexibility for study), Coursework load (The amount of work required in this unit was reasonable), Overall experience (Overall, I had a satisfactory learning experience in this unit)



FURTHER RESEARCH

PBL will be introduced to another unit in the same area and student engagement analysed. The cohort of students in the second unit (Personal Communication Systems) will be different from that of the first unit (Data Networks). Furthermore the units will be at a different level within the curriculum (Level 7 vs. Level 4). Whereas the current results do not refer to specific part of delivery (lecture, tutorial, practical) in future feedback specifically on PBL sessions will be sought to gauge not only the applicability but also the relevance of problems posed during the sessions.

CONCLUSIONS & CHALLENGES

Based on improved feedback on the unit, it can be concluded that supplementing some lecturer-centric activities with decentralised, self-directed learning during PBL sessions improved student engagement. PBL in telecommunications has the potential to help students achieve better learning outcomes for the units, thereby producing engineers with better attributes. However, it will be challenging to generalize the results obtained for relatively small cohorts of students over a period of five years.

REFERENCES

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KEYWORDS

Problem-based learning, teaching pedagogy, learning outcomes.
