



Developing teamwork and other professional skills while teaching reinforced concrete design.

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Summary

Professionals, in addition to being technically competent, need a range of generic skills including, teamwork, communication, being able to think both critically and independently, being able to critically appraise one's work and the work of others and an appreciation of the need and value of reflection in both their personal and professional life [1,2]. However, there is a reported competency gap between the skills required by employers and those developed by students during their undergraduate courses [3,4]. At the University of Technology, Sydney, we are using self and peer assessment in our Engineering program to develop professional competencies in undergraduate engineering students. Its coordinated use is providing opportunities for students to practise, develop and assess their professional skills and develop their judgement [5] within subjects where traditional discipline content is taught.

Keywords: self and peer assessment, graduate attributes, teamwork, online tools, SPARK, reinforced concrete education.

1. Introduction

Professionals, in addition to being technically competent, require the skills of collaboration, communication and the ability to work in teams [1,2]. However, there is a reported competency gap between the skills required by employers and those developed by students during their undergraduate courses [3,4]. Scott and Yates [2] note that successful engineering graduates rated their ability to contribute positively to team-based projects as the most important of 49 possible reasons for their success. Technical expertise, while acknowledged as necessary, and receiving the greatest amount of teaching time during their degree, was rated a comparatively low 29th. In response to this, universities both in Australia and internationally [6] have introduced attributes which their students should develop during their degree.

Within the engineering program at the University of Technology, Sydney (UTS), we are coordinating the use of self and peer assessment to provide students with opportunities to practise, develop and assess their professional skills and develop their judgement [5], including within subjects like Structural Design 1 where traditional reinforced concrete content is taught.

Incorporating self and peer assessment, especially in large classes, is impractical without the assistance of online tools. In this paper we discuss our use of an online tool called SPARK (Self and peer Assessment Resource Kit [7]) to integrate the development of graduate attributes while teaching reinforced concrete design.

2. Self & peer assessment in Structural Design 1

In the subject Structural Design 1 self and peer assessment is used to assess work, assign marks and provide feedback on a combination of both discipline specific and generic professional attributes with which students must engage in completing a major group project. Each self and peer assessment exercise involves the students in rating each other against a number of criteria determined by the academic.

An online post subject survey was used to obtain student feedback. Most survey questions were written in 5-point Likert format. Perhaps the most encouraging result was the fact that a significant number of respondents reported that their group and their tutor provided them with useful formative feedback (52% & 54% respectively) and that the project enabled them to develop skills in working as part of a team (56%).

3. Conclusion

In Structural Design 1 a group project is combined with self and peer assessment processes to develop students' skills to design various reinforced concrete elements. The process requires students to not only apply their engineering knowledge and use judgement in making design decisions, but to articulate and explain their design. The process of critically evaluating their own and their team members' work and behaviour is explicitly linked to the assessment tasks by using criteria that address the subject learning outcomes. The feedback sessions play a significant role in engaging students with developing both their technical and more generic professional skills. Ongoing research is focussed on providing more efficient and effective resources for these feedback sessions.

4. References

- [1] LANG J. D., CRUSE S., MCVEY F. D., and MCMASTERS J., "Industry expectations of new engineers: A survey to assist curriculum designers," *Journal of Engineering Education*, vol. 88, pp. 43, 1999.
- [2] SCOTT G. and YATES K. W., "Using successful graduates to improve the quality of undergraduate engineering programmes," *European Journal of Engineering Education*, vol. 27, pp. 363, 2002.
- [3] MEIER R. L., WILLIAMS M. R., and HUMPHREYS M. A., "Refocusing our efforts: Assessing non-technical competency gaps," *Journal of Engineering Education*, vol. 89, pp. 377, 2000.
- [4] BRYAN R. M. M., CASE J., FRASER D., "Engineering graduates' perceptions of how well they were prepared for work in industry," *European Journal of Engineering Education*, vol. 30, pp. 167 - 180, 2005.
- [5] BOUD, D., and FALCHIKOV, N. *Rethinking Assessment in Higher Education Learning for the Longer Term*. Routledge, 2007
- [6] ABET (2007), *Leadership and quality assurance in applied science, computing, engineering, and communication*. <http://www.abet.org/> last viewed July, 2007
- [7] SPARK, Self and Peer Assessment Resource Kit, <http://www.educ.dab.uts.edu.au/darrall/sparksite/> last viewed Sept 2007.