'Teach the teacher': Design and evaluation of a professional teaching development program

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Abstract

A significant aspect of engineering education is the tutorial experience. This article describes the development and evaluation of a Tutor Development Program delivered within a School of Engineering in one of Australia's leading universities. The paper presents a novel framework for an extended tutor professional development program that fosters interactive ways of engaging students. Evaluation of the program involved feedback from participating tutors, their students and the program facilitator. Our results show that tutors found the program extremely useful and, in turn, their students responded positively to the strategies tutors implemented. Observations by the program facilitator support these findings. We argue that an extended professional development program that facilitates active engagement is a crucial component in engineering education.

Keywords: Teaching development program, active learning, evaluation, quantitative, qualitative approach

1. Introduction

The focus on student centred learning has compelled universities to address the professional development of their tutors (teaching assistants). Tutors teaching in small classrooms are more likely to engage with students and have impact on their students' learning experiences in tutorial environments (Christie and de Graff 2017; Freeman et al. 2014). It follows that if informed and effective teaching practice is to be implemented across all engineering programs, tutors need to learn *how to teach*. The challenge is to design the kind of program that would equip our novice tutors with both the skills and perspectives needed for teaching. In particular, most tutors in Australian Universities are students themselves, undertaking a postgraduate program in the university, have never taught before and many have experienced very different educational experiences in their home countries. It is therefore our responsibility to prepare and upskill these tutors for positive teaching experiences. In this paper we outline the key literature we used to provide a pedagogical basis for a professional Tutor Development Program (TDP), its content and the evaluation of the program's effectiveness for both students and the tutors. We realized that we could not achieve our desired learning outcomes with a single session, or indeed, an online program. We therefore designed a six week professional Tutor Development Program (TDP) and evaluated its effectiveness for positive teaching and learning experiences.

2. Background literature

Our program needed be transparently robust. We had to be able to explain to tutors that the approaches we were asking of them were not just a case of *this is the way we do things around here* but content founded on pedagogical theory and research. It was also crucial that tutors be introduced to the fundamentals of what it means to teach in ways that provoke students become independent learners; to be able to take what they have learned and apply in unfamiliar contexts. Furthermore, the disciplines of engineering and IT cover broad territory. Below are some key concepts used in the literature.

There is an understandable tendency to teach in the manner in which we ourselves were taught. Mazur (2009) admits that as a new academic he did not reflect on how he would teach his students – he simply did "what his teachers had done". For our program, the activity of *reflection-in-action* (Schön, 1987) whereby the act of reflecting takes place during the experience when there is opportunity to have positive impact. Ramsden (2003) points out that *"good teachers are always evaluating themselves"*. The TDP requires that participants must be currently employed as a tutor. In this regard, tutors become engaged in what Lave and Wenger (1991) refer to as a *community of practice* – an interactive group that embodies the desired beliefs and practices that members wish to develop and practice. It is argued that learners tend to be more inclined, more motivated and feel compelled to

learn through their engagement in an authentic context. Hence, the TDP becomes a *community of tutoring practice* and in a position to draw upon the benefits of the immediate nexus between tutoring practice and professional development. For the most part of the 20th century, Australian universities have clung tight to the idea of *"content-driven telling"*. Amid mumblings of change, came the work of John Biggs (2011, 2016) who encapsulated the essence of what it means to teach effectively by reawakening Thomas Shuell's (1986) quote *"…what the student does is actually more important in determining what is learned than what the teacher does"*. The works of John Biggs and Paul Ramsden (2003) provide coherent arguments for the *constructivist* approach to university teaching. In the constructivist model, the tutor does not 'impart what I know', but rather generates opportunities for students to actively make sense of what it is they are experiencing.

In a comprehensive meta-analysis of 225 studies by Freeman et al (2014), findings reveal that average examination scores improved by about 6% when active learning strategies were employed. The work concludes by stating that the study's outcomes *"support active learning as the preferred, empirically validated teaching practice in regular classrooms"*. Modelling is perhaps the most fundamental means of learning. As Bandura (1977) explains *"most human behaviour is learned observationally through modelling: from observing others one forms an idea of how new behaviours are performed and on later occasions this coded information serves as a guide for action"*.

Asking thought-provoking questions is an essential skill for any tutor. The right kind of question, King (2002 p. 4) argues, *"opens the door to student's participation"* and to students *"applying their current understanding to the content or the problem"*. King (2002) adds, *"the problem is to stop teachers from precluding the chance for that to happen"*. One aspect embedded in the program was that of helping our tutors become aware of the importance of providing a *safe* learning environment where students feel comfortable to proceed from 'not knowing' to confident acquisition. Evidence from recent neuroscience research suggests that if learners feel stressed in their learning environment they are less able to build the necessary neural connections (Willis, J. 2007). Finally, peer teaching and peer discussion are becoming recognised strategies that enable students to actively learn through interaction with another student (Crouch and Mazur, 2001). These studies utilize the effectiveness of peer interaction in his 'turn to your neighbour' activity; the *ConcepTest*. The TDP has consciously used this method in educating tutors.

3. Tutor Development Program (TDP) and Evaluation

Our aim was to design a program that equips our novice tutors to facilitate effective teaching and learning experiences. Below we describe two aspects: (1) the TDP framework (Section 3.1) and (2) an evaluation the effectiveness of the TDP (Section 3.2).

3.1. Professional Tutor Development Framework

It is expected that by the end of the program, tutors are able to: *plan* tutorials with stipulated learning outcomes; *interact* with their students individually and collectively; *manage* differences in student capability, personality, degrees of confidence and language fluency; *explain* clearly and logically concepts and procedures; *thoughtfully and respectfully manage* those students who may dominate, distract, appear disinterested or disengaged; *encourage* students with respect and patience; *engage* students intellectually through active participation, challenging students to think and express those thoughts; and *reflect* on their tutoring practice in order to implement ongoing improvement.We developed a six-week program beginning with a Professional Development Day prior to the start of semester. This is followed by two-hour workshops during the subsequent five weeks. Below is the current framework of the TDP as shown in Figure 1.
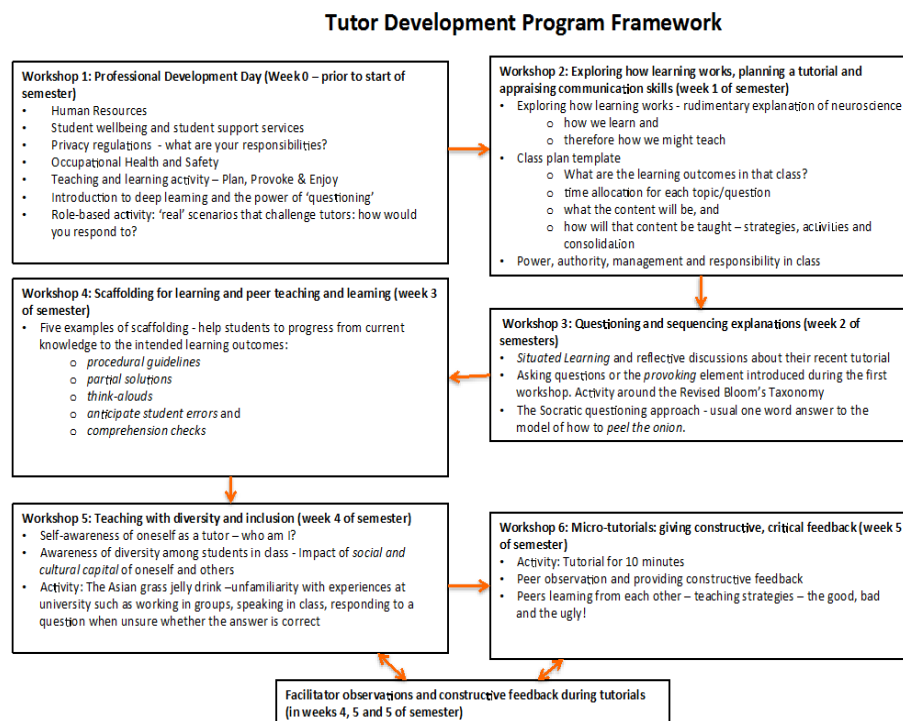

Figure 1. Tutor Development Program Framework.

This includes all tutors being observed for a minimum of 30 minutes by the TDP facilitator (see Figure 1). Constructive feedback, compliments on effective teaching, reminders of where students could have been worked harder or strategies that might be implemented are emailed soon after to the tutor by the facilitator.

3.2. Evaluation

Evaluation of the research involved: (1) Feedback by the tutors of their experience of the usefulness of the TDP to their teaching; and (2) Feedback by the students of the tutors. We acknowledge some of the inherent problematic issues when conducting this kind of study that relates to the capacity of a student to judge good teaching and queries whether student evaluations are more about popularity (Hornstein, H. A, 2017). Our focus was to ask the students to respond according to their learning experiences. Although the TDP has continually revealed high tutor satisfaction ratings since its inception, we needed to capture whether these students, the ultimate stakeholders, respond positively in terms of their learning, when taught by 'trained' tutor? To that end we collected: (1) feedback from tutors that attended the program in two semesters; and (2) feedback from students about their tutors who had attended the program. In order to gather feedback from tutors, we used a questionnaire that had two components; (1) on a Likert scale of one (strongly disagree) to five (strongly agree), against perceptions of the Program's *usefulness* or *helpfulness* to their classroom tutoring; and (2) list of the teaching strategies developed during the program that they have implemented in their classrooms. With ethics clearance in hand, fifty-seven (57) tutors who attended the TDP agreed to participate. Further, we invited students whose classes were taught by tutors who had just completed the TDP.

A total of 186 students from seventeen (17) such tutors agreed to provide feedback on their learning experiences on their classroom tutor. The students were asked the following questions on a Likert scale of one (strongly disagree) to five (strongly agree): (1) *Overall, the tutor's teaching strategies helped me learn*; (2) *The tutor has good organisational skills (was punctual, prepared);* (3) *The tutor's explanations were clear and understandable;* and (4) *The tutor helped me gauge my understanding and progress in this subject.* We also asked students an open-ended question: *"List briefly what the tutor did that helped you to learn. Please provide examples"*.

Tutors' self reports on the TDP: At the conclusion of their six-week program, fifty-seven (57) tutors were asked to anonymously provide both closed and open feedback on their experience of the TDP. Firstly we asked tutors to complete a statement, using a Likert format - "From my perspective, the Tutor Development Program was… " (1) *Rarely useful or helpful*; (2) *of little use or help*; (3) *no opinion either way*; (4) *often useful or helpful*; and (5) *extremely useful or helpful*. Fifteen tutors out of the 57 (24%) indicated that they found the program to be *often useful or helpful* in their tutoring practice. However, most tutors (74%) indicated that the program was *extremely useful or helpful* as shown in their responses. Secondly, we were keen to find out what particular skills the tutors report having learned during the TDP and transferred into their classrooms. Tutors were asked to respond to the statement: *"If applicable – list the teaching and learning strategies [that you developed during the Tutor Program] that you now employ in your tutorials"*. Each tutor

wrote multiple responses to this question. In total, we collected 202 responses. These responses were condensed into five dominant themes. Tutors reported: (1) Employing questioning strategies to provoke thinking; (2) Engaging students in peer interaction; (3) Explaining concepts clearly; (4) Working at generating a safe and respectful learning environment; and (5) Providing scaffolding strategies to support learning. The results show that tutors have recognised the crucial importance of questioning as fundamental to student engagement. This is evidenced in comments from tutors who wrote that they, *"Always ask why we need this, why is this different, why does it work this way – connecting things together by asking why"*. Tutors recognized the value of collaborative learning, *"We should create opportunities for them to share ideas and learn from each other"*.

An effective teacher is one who has the ability to explain complex concepts clearly and simply especially in the engineering discipline. This practice has been reflected in the responses the tutors provided: *"Use examples from the real world to relate concepts with concrete objects"*. Scaffolding strategies are techniques that teachers employ to help their students progressively move towards becoming independent learners. Tutors report that they have used a variety of scaffolds in their classes. For example, *"Partial solutions – I use it with mathematical problems as it encourages many people to answer"*. The scaffolding strategy *think-aloud* was also reported as being used by a tutor, *"Explaining my thought processes when reading and tackling a question"*. Learning from the TDP, some tutors also noted the importance of using respectful interaction as picked up from the TDP: *"Previously, I think it might have been okay to ask a person directly a question if he or she is not paying attention to the class as a reminder for him or her to pay attention... it is not okay to do so because a tutor should not use questions as a weapon to attack students"*.

Students' feedback on their learning experiences with their tutor: In this formal evaluation study, 216 students provided feedback on their learning experiences in a tutorial delivered by one of their TDP tutors. We asked students to respond specifically to what only they can tell us. That is, their experiences of: (1) their tutor's organizational skills; (2) the tutor's skills in encouraging participation; (3) the tutor's clarity of explanation; (4) the tutor's strategies in helping students gauge progress; and (5) the students overall experience of their tutor's teaching strategies. A feedback questionnaire was used as shown in Figure 2 along with an open question (2) *If applicable, how did this tutor help you learn?* Most students (94%) strongly agreed or agreed that their particular tutor's organizational skills were good (emphasis on time-on-task) and that their teaching strategies helped the student learn. Further, the student responses (90%) indicate that they thought that their tutor's explanations of a topic were clear and engaging. Students' responses show that 88% of students felt that their tutor helped them gauge their understanding and progress in the subject. They (88%) felt that they were encouraged to participate in their tutorial.

In response to the question: *If applicable how did this tutor help you learn,* we identified four particularly dominant themes that were revealed from the 216 student responses. It was evident that a tutor's *friendliness* and *supportiveness* had positive impact on the students' learning experiences. Students reported that the tutor generated a *"friendly relaxed atmosphere where it was encouraged to ask questions... if I do not understand the reasoning behind something I do not hesitate to ask about it and I am confident I will receive a good answer"*. The value of being asked questions and not being 'spoon-fed' was noticed by students: *"He asked questions which facilitated my learning"*. Giving explanations is a fundamental aspect of engineering tutorials. It is not surprising then, that the quality of tutors' explanations did not go unnoticed, students said: *"step by step explanation in the class has been very helpful"*. The fourth dominant theme – *encourages group discussion and interaction* shows that students recognise active learning strategies as a helpful to their learning. For example: *"the tutor aided learning by giving time for discussion of the subject material"*. Students appeared to be aware of the teaching strategies that fostered interaction, *"...for many questions (he) will ask students to write on the whiteboard which I find (makes) the class more interactive"*.

4. Discussion and conclusion

This paper has endeavoured to describe a program that we believe effectively equips our tutors to develop the capabilities that foster positive teaching and learning experiences. For us, a key indicator of the success of the TDP, was evidence that tutors provoked their students to *actively think*. Too often we do the thinking for our students. And too often we deliver up a pre-digested diet of neatly turned out ideas, concepts, theories and practice with little effort on the part of those sitting down. For many tutors, their educational experiences have been embedded in a teacher-directed environment where teachers *deliver* content and students are passive *listeners*. For these tutors, it was a significant and often difficult transition from the idea of 'telling' students or 'imparting my knowledge' to a more student-centred approach involving active and engaging participation. The difficulty lay not in appreciating the strength of student-centred learning approaches but rather in the confidence of executing them.

We argue that the nature of our program is designed to model the kind of engaging learning environments that we would like our tutors to generate in their classrooms. While a small number of tutors start the TDP with less than desirable enthusiasm, by the end of the third workshop, these tutors are observed to be keen and actively engaged. Similarly we realise that not all students are keen to attend their tutorials, but hopefully the kind of active learning experiences offered by their tutors will encourage those students to attend their tutorials. If designing and delivering a tutor development program was problematic, and then evaluating such a program was also a challenge because of complexities in context,

content and diversity. A limitation in our study was that we could not evaluate the program under controlled conditions where the effectiveness of teaching and learning experiences could be manipulated. However, we have evaluated our program by triangulating feedback from a range of sources including tutors that attended the program; students of those tutors; and observations from the facilitator of the program. Given the findings in this study, we recommend a tutor development program be implemented within engineering faculties to build confidence and capabilities in tutors by exposing them to best teaching practices for enhanced learning experiences of their students.

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