Evaluation of a program for the development of peer mentors

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CONTEXT

Peer-led team learning (PLTL) is a well-defined active learning model that emphasises student achievement through active learning in small peer-led teams. The "peer leaders" are not content experts, but rather more experienced students who guide by questioning, engaging every student to be part of the conversation, and helping them reflect on the material to understand the process and the approach to a problem. Team learning builds strong study skills, develops critical professional skills such as working in teams, listening, and critical thinking. It fosters communities of learners who approach learning as a way of life. In addition, PLTL can play a significant role for the learning and development of those serving as peer-leaders/mentors. At the University of Melbourne we have implemented a unit to support the leadership development of peer and industry mentors, who in turn are each leading, in a parallel unit, student teams working on industry-sponsored innovation projects.

PURPOSE OR GOAL

The immediate purpose of the study is to evaluate the effectiveness of the leadership training of the peer mentors, with the long-term goal being to understand how these lessons can be transferred to other contexts. To this end, we asked three research questions: (1) to what extent does the unit deliver the intended learning outcomes, (2) do mentors feel equipped by the leadership unit to manage their authority over peers, and more generally (3) what is the peer mentor experience in the two units?

APPROACH

We took a grounded theory approach as our focus is on the mentors' learning and experience. We developed a focus group protocol using open-ended questions, and conducted a focus group with six of the seven peer mentors. This has been transcribed and analysed thematically using pre-identified codes for the different learning outcomes whilst remaining open to what other themes emerged in the discussion as salient to the participants.

OUTCOMES

Beyond meeting the stated learning objectives of the unit, several other themes emerged in the analysis of the focus group transcript. These were around dealing with ambiguity, the sense of community amongst the mentors and staff, perceived differences between the industry and peer mentors, and the power of the 'on the balcony' metaphor. Beyond all of these, what stood out most was the transformational nature of the mentoring experience.

CONCLUSIONS

Although this study was only conducted with a small group of participants, the results suggest that the scaffolded mentoring program was a powerful learning experience for the participants. Future research will triangulate the findings with data from team members, industry mentors, and project sponsors, and investigate if such learning can be replicated as the program scales.

KEYWORDS

peer-mentoring, leadership, innovation

Background

The subject *Creating Innovative Engineering* was initiated in 2017 to increase the employability of graduates from the University of Melbourne School of Engineering. The school recognised that the nature of engineering (and other professional practice) had changed over the preceding decades. In particular, design is central to professional work, and design involves answering two inter-related questions, viz "What should we build?" (and equivalent questions for other professions), and "How should we build it?" Traditional engineering education focuses on the second question. However, with the proliferation of computerised tools, the locus of value creation has moved from the second question to the intersection of the two (authors). That is, employers now value engineers who can work on teams to develop innovative solutions to important conceptual design problems and be confident their solution is technically feasible and economically viable. As a result, employers were no longer looking just for deep technical capability. They were also looking for interpersonal and innovation skills (Australian Association of Graduate Employers, 2020).

The school's solution was to create a subject in which teams of Master of Engineering students worked on an innovation challenge from an industry sponsor, mentored by a representative of that sponsor (Cebon, Mitchell, Tran, & Ooi, 2019). Over time, the program has evolved in many ways, three of which are relevant to this paper. First, in order to ensure the quality of the student experience, the program started to give the mentors leadership training. Mentors learned in the leadership classroom, and by working with their team. Second, early on, alumni of the subject started to help with the teaching. In the second semester, each team had a second mentor -- an alumnus of the first cohort. This was very successful, but prohibitively expensive. In the third, fourth, and fifth semesters, small groups of alumni worked as paid mentors, generally mentoring clones of other projects. Program faculty observed that student mentors often grew significantly as a result of this experience. By 2019, the program was sufficiently happy with the quality of the leadership teaching, and knew enough about the challenges specific to the student mentors, to offer the student leadership development and mentoring experience as a subject: *Leadership for Innovation*. This paper reports on the first cohort of students enrolled in that subject. Third, the program found that there were often situations in which sponsors welcomed the opportunity to offer a project with a student mentor. Generally, this was because they wanted to pursue the project, but couldn't identify or support a suitable staff member as the mentor.

Student mentors were selected in a four-stage process. First, the mentors from semester 1, 2019 were invited to nominate the members of their team whom they thought had the appropriate qualities to take on the student mentoring/leadership role. ~15% of students were nominated. Second, all the nominees were asked if they were interested in taking the leadership subject. About half declined, generally because they were graduating or because they didn't have an appropriate slot in their study plan. The teaching faculty then ranked the remaining candidates on the basis of their demonstrated capacity for insightful reflexive thinking (Schön, 1987), as well as experience with them in the classroom. Finally, candidates were matched to available projects.

Leadership development

Developing leaders of the future is a complex but central responsibility of universities (Connaughton, Lawrence, & Ruben, 2003). However, what engineering leadership means, and how best to teach it, are contested (Schuhmann, 2010). Engineering leadership education programs are very diverse, with three of the key dimensions of variation being the focus, delivery mode, and pedagogical approach (Klassen et al., 2016). For example, two common foci were "entrepreneurship and innovation" and "personal and professional growth", which were both at the centre of *Leadership for Innovation*.

Connaughton et al. (2003) summarised some of the literature to identify several principles for successful leadership development programs. These principles, and how they were enacted in the *Leadership for Innovation* subject, are summarised in Table 1.

Table 1: Enacting principles of leadership education in *Leadership for Innovation*

Connaughton et al. (2003), p. 48	Design of *Leadership for Innovation*
"learning opportunities must be created to allow students to apply and practice their knowledge and to experience the consequences of their actions"	Students in *Leadership for Innovation* were directly applying their skills each week in mentoring their student teams in *Creating Innovative Engineering*
"Situations must be created that allow students to receive feedback on their leadership processes both inside and outside of the classroom"	Peer mentors received feedback from both their student teams and from their tutors and peers in the classroom
"students must be strongly encouraged to reflect on and discuss their leadership experiences with faculty members and peers [as] reflection is essential for integrating knowledge, experience, and character"	Weekly 3-hour interactive tutorials stimulated reflection and discussion, and weekly reflections were a key component of assessment
"students must have vicarious learning opportunities. Students learn from more experienced leaders by listening to and interacting with them"	Peer mentors interacted with industry mentors and tutoring staff (themselves experienced industry leaders) in weekly tutorials

With these principles in mind, the *Leadership for Innovation* subject was designed not only to cultivate an understanding of underlying theory, but to develop practical skills and capacity in leading teams, with scope for reflection and discussion with more experienced peers. These goals were operationalised as the following learning outcomes:

> LO1: Understand the basic theoretical issues underlying the management of teams (theories of motivation, team formation, group process, etc.)

> LO2: Understand key theoretical issues underlying the leadership of innovative teams (collaboration, adaptive leadership, reflexivity in group dialogue, the need to be present and aware, etc.)

> LO3: Develop skills in the leadership of teams

> LO4: Develop and demonstrate the capacity to reflect on their leadership behaviour

> LO5: Develop and demonstrate the capacity to give constructive and developmental feedback to peers

Methods

This study investigated the following research questions:

1. to what extent does the unit deliver the intended learning outcomes?

2. do mentors feel equipped by the leadership unit to manage their authority over peers?

3. what is the peer mentor experience in the two units?

To investigate these research questions, an approach inspired by grounded theory was adopted. Grounded theory first developed in the 1960s with the work of Glaser and Strauss (1967), and is a qualitative methodology intended to generate "theory that explicates a phenomenon from the perspective and in the context of those who experience it" (Birks and Mills (2015), p. 17). Since its inception, different schools of grounded theory have emerged. One point of distinction between these different approaches is the degree to which research questions are narrowed before embarking on data collection. Some researchers have argued that the research questions must be more tightly focused in order to limit the scope of the research (Birks & Mills, 2015), while in its original framing Glaser and Strauss (1967) argued that the research questions should emerge during the research process. This has been characterised as the emergence versus forcing debate (Birks & Mills, 2015).

The research questions in this study range from the tightly focused question regarding the extent to which the intended learning outcomes are achieved, to the more open-ended question about the nature of the peer-mentor experience, leaving it up to the respondents to identify what was salient to them.

A focus group protocol was developed to investigate the experiences of peer mentors. All seven peer mentors from the previous semester were invited to participate, and six took up the offer. Since the focus group was conducted several months after the subject had been completed, the facilitators led an introductory mindfulness exercise to bring everyone into the space and start the reflective process of looking back on their experiences in the subject. Then participants were invited to silently respond to five questions on Post-it notes, and group these on five different posters. The prompt questions were:

1. What did you like about Leadership for Innovation?
2. What are the key skills/attributes that LFI helped you develop?
3. What elements supported your development?
4. What challenged you in the program?
5. How might the program be improved?

The questions were designed to open up a discussion about their experience and learning in the subject, without for example specifically prompting them with closed questions about whether they achieved a particular learning outcome. Their responses on the Post-it notes were then used in a semi-structured way to open up discussion with the whole group. Towards the end of the session, a prompt question about their experience of managing their authority with peers was asked, to ensure Research Question 2 was addressed, before closing with a final invitation to add any more thoughts or comments.

The session lasted approximately 90 minutes, and was audio-recorded before being transcribed. The transcript was coded in NVivo with a mix of pre-determined codes, for the five intended learning outcomes, and codes that emerged through re-reading and analysis of the transcript and discussions amongst the research team.

Results and Discussion

How well were learning outcomes met?

There was evidence in the transcripts that all the learning outcomes were met to some degree, except for LO1 regarding theories of management. Participants not volunteering comments about theories of management is interpreted as being more an artefact of the protocol and focus group setting, rather than evidence of absence.

Conversely, participants did make comments related to each of the other LOs. Some representative quotes are given in Table 2. Note that all mentor names are pseudonyms.

Table 2: Representative quotes against the Intended Learning Outcomes

Intended Learning Outcomes	Representative quotes
LO2 Theories of leadership	"I feel like this course somehow provides us the leadership theories in a more structured way" *Laura* "you sort of had the framework of learning, so oh actually I was applying this to get this outcome. And having that theoretical knowledge helped me reflect better I reckon, and thus become, like, yeah, perform better, and help the students perform" *Nathan*
LO3 Leadership skills	"obsolescence ended up being a good thing, because the projects were ticking along, the team were doing their job, and I just popped in and said, yep, doing a good job, you know, and facilitated and got in when they fell off track. But, like obsolescence was the target. In the end, yeah." *Paul* "I remember coming to that conclusion where, I like to talk, and so I need to shut up sometimes, like and consider - is what I'm saying worthwhile, is it going to help progress their project in any way" *Suzanne*
LO4 Reflecting on leadership	"we had to do reflections every week and, and I'm not going to lie knowing that the marks reflected you reflecting better. Like it was definitely, like a little incentive" *Suzanne* "it's important for me to better lead, or better understand myself, better understand what my values were" *Paul*
LO5 Giving feedback	"Find that balance, yeah. I don't want them to feel like I'm just, be there cause I had to, but, I want to be there to help them, but without giving them any directions, I want them to figure out the direction, so that was… the biggest challenge" *Rebecca*

A cross-cutting theme across many of these responses is the tension between *stepping in* to assert authority and lead explicitly, micro-managing as it were, versus *stepping back* and supporting from afar. This is evidence in Paul's comment about "obsolence [being] the target", and Suzanne's and Rebecca's comments about choosing to "shut up sometimes" and give their students a chance to "figure out the direction". Similarly, Elise contrasted her experiences mentoring in LFI and another more technical subject:

I always feel like, oh my gosh no, this is the best way to build this, you know, particular mechanism, and I was like, students, listen to me, I'm the mentor, but you listen to me, you do this. So in this class for some reason I didn't feel the urge to say anything

This tension between stepping in and stepping back was echoed several times through the transcript, often employing the metaphor of being 'on the balcony'. This will be explored further in the next section.

What is the peer-mentor experience of Leadership for Innovation?

Beyond meeting the stated learning objectives of the unit, several other themes emerged in the analysis of the focus group transcript. These were around dealing with ambiguity, the sense of community amongst the mentors and staff, perceived differences between the industry and peer mentors, and the power of the 'on the balcony' metaphor. Beyond all of these, what stood out was the transformational nature of the mentoring experience.

Transformation

Almost all of the peer mentors described some dramatic change in personal mindset or behaviour that extended beyond the confines of the subject. These changes included a deeper awareness of one's own values or deeper reflection more generally, greater openness to challenges and new experiences, and the development of strategies for combating impostor syndrome.

For example, Suzanne described going deeper and deeper in her own reflections:

> I found a change that happened to me was reflections in the aspect of I asking myself why more - like why am I feeling this way, why am I feeling that way, why do feel that way about feeling that way, like I really tried to like think deep and really figure out like what the core was, like why am i insecure, why does it matter that i'm insecure, like, does being insecure really matter in the end?

Likewise, Paul pondered his own identity and found it affirming being able to articulate his values:

> I thought about, really thought super hard about what my values were. I feel like if… and I came up with some, you know, that made me feel warm, you know… I actually believe them, I'm not just saying them in some session in a class.

Nathan was prompted by his tutor to reflect on some existential questions:

> he'd really get the whole class discussing, amongst ourselves, and really sort of questioning it... he'd sort of make us question, sort of, why we're here

A different sub-theme of transformation was greater openness. This is profound as 'openness to experience' is one of the 'Big Five' personality dimensions and is related to some aspects of job performance (Barrick & Mount, 1991).

Elise recognised she'd become more open:

> I'm keen to give everything a go, like I don't mind what I do. So that's sort of, a change of attitude...I mean previously I probably would be like, oh, this is what I want to do, like, and now it's like I'm keen to give everything a go, and just see where it leads

Similarly, Nathan started describing a shift in what assumptions he made when faced with a new challenge, before the focus-group conversation changed direction:

> All the time you're presented with challenges. The way I actually approach a challenge initially has definitely changed. So I think instead of already having assumptions, I'm coming up with a much, sort of…

A final form of transformation was overcoming imposter syndrome, as Rebecca explains:

> I think one of the biggest things this program has helped me with, um… my impostor syndrome. So that's when like, I, usually when I go to an event, or even get invited to speak, I always think oh why me … And then like having those conversations that were in a very safe space and everything in our clusters and i realise, oh, everyone's the same, and … knowing that everyone is experiencing the same thing, no matter how we, like how high up they are in the company, how much experience they have, they always have the same problem.

Community and belonging

Rebecca's sense of the imposter syndrome was offset by how she saw parallels between herself and the other mentors. Other peer mentors echoed this sense of connection and identifying with others. For example, Laura explains that the industry mentors were:

> *older people that have had similar experiences to us, and are going through the same thing, with us as well, it's also a good time to see that, to see what other people are doing,... and seeing them, okay, they also have their struggles. I have the same struggle as well, I feel related to that person. So it was more like a sense of belonging, yeah, a community*

Industry versus peer mentors

Although the peer mentors developed a sense of community with the industry mentors, they sometimes grew frustrated, feeling that the industry mentors weren't as engaged with some of the activities. For instance, Elise claimed that "the other industry mentors didn't take it as serious as how we took it…maybe because we were assessed", while Paul felt that the industry mentors "stopped reflecting around Week 5".

Dealing with ambiguity

One of the challenges faced by peer mentors was managing the ambiguity of the design process with their teams. For example, Rebecca described her experience of reaching an impasse in the design process:

> *we need to come up with a solid idea, and then, there was ... everything was still very ambiguous, nothing was settled, and then the students were frustrated, they didn't know what to do, so we had like meeting [up in the] room, and they just throwing up ideas, but like they're all contradictory, and then I had my own ideas, I really really wanted to tell them, but... it's just so hard, and you just see them being so frustrated, and you just, also get frustrated, at them, because, like, you can't really...it's not my project, I just need to be here to support them, and to move them along, but…*

Her frustration seems to stem in part from the inherently nonlinear nature of the design process, but also from a tension around 'stepping in' to help and 'stepping back' to let the students own the project. This was expressed by several of the peer mentors using the metaphor of being 'on the balcony'.

'On the balcony'

The phrase getting 'on the balcony' has been explored by Ronald Heifetz and his colleagues as a metaphor for business leaders stepping back from being back "swept up in the field of action" (Heifetz and Laurie (1997), p. 125) to instead seeing the broader contexts and patterns of action and change. Discussions of this metaphor formed part of the *Leadership for Innovation* curriculum.

Several peer mentors reprised this theme, describing how they found the metaphor a fruitful way to think about how they sometimes needed to step back so that their student teams could step up.

For example, Laura used the metaphor to describe how she has learned to step back from micro-managing and become more open to different views:

> *one of the biggest challenges I've got during the program was standing out on the balcony… [Facilitator: Can you tell us what that means?] So, basically not micro-managing stuff. It's like, letting other people speak, and listen to other people. Yeah, so, that's somehow really helped me when I'm working with other people as well… to listen to what other people think before you actually present your opinion. And accept different ways of thinking... that's one thing that i've changed a lot,*

Rebecca also found it a useful metaphor. She explains:

> *I was just thinking about the balcony situation, like actually not inputting my idea into the student project...I guess I just kept the…being, like, the balcony, this, this phrase in mind… I want to be there to help them, but without giving them any directions, I want them to figure out the direction, so that was… the biggest challenge*

Similarly, Paul was torn between intervening to demonstrate his value, and stepping back to let his students do the work:

> *In the earliest weeks, I wrestled with obsolescence - do you remember me writing so much about obsolescence, about like what, Why am I even here? ... In the beginning, I was like, I was, I kept trying, like to Rebecca's point, I kept trying to insert myself, and add value, right? I need to add value here*

Eventually he came to the conclusion that "if [the students] didn't need me, I was [laughter] I was doing a good job".

Limitations and Future research

There were two primary limitations. One issue was the sample size. The sample size wasn't so much of a limitation in the sense of limiting the trustworthiness of the findings about the participants' experiences, as sample size is not a prerequisite in interpretivist research. Rather, it points to a bigger pedagogical question of whether such a meaningful learning experience can be replicated at scale, with larger numbers of peer mentors.

A second issue is the methodological question about the extent to which analysis of focus-group discourse can be used to make inferences about experiences and behaviours (Säljö, 1997). For example, learning outcomes 3 and 5 refer to proficiency in practical skills, of leadership and giving feedback respectively. Short of observational studies of the participants leading teams and giving feedback, and of collecting data from their teams, this self-report data should be interpreted with regard to the social desirability bias (Nederhof, 1985), which can motivate respondents to both paint a positive picture of themselves and try to meet the expectations of the researchers.

Future research in this area will seek to triangulate this self-report data with other sources, such as interviews with team members, industry mentors, and project sponsors. In addition, as the peer mentor program expands, we hope to evaluate it on a larger scale.

Conclusions

This project sought to evaluate a peer mentorship program for engineering students to support their peers in developing innovative industry-sponsored design projects. This was done by first evaluating whether the intended learning outcomes were achieved; second, by investigating how mentors manage authority over their peers; and finally, third, by seeking to understand more generally the experience of the mentors.

As much as is revealed by self-reports, the learning objectives were largely met, excepting LO1 on theories of management. Managing the mentors' authority over peers was characterised by ambiguity and tension, about whether to figuratively step in, step back, or step up. Beyond that, the stand-out finding was the potency of the experience for the students. Most of the peer mentors reported the experience as catalysing substantial changes in their behaviour or mindset, beyond the context of the subject. The key takeaway therefore is that such scaffolded mentoring of peer-leaders can indeed be transformative.

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