

The Role of CQUniversity's Student Mentoring and Leadership Program in the Engineering Program during and beyond university

Gemma Mann

CQUniversity, Rockhampton, Australia
g.mann@cqu.edu.au

Llewellyn Mann

CQUniversity, Rockhampton, Australia
l.mann@cqu.edu.au

***Abstract:** Mentoring is an integral part of producing “advanced engineering capability”. Being a mentor during the engineering undergraduate course is a good way to learn about effective mentoring and to develop professional and transferable skills to take into engineering practice. The CQUniversity student mentor program provides a structured setting to obtain guidance as a mentor and to provide access to relevant professional development. The cycle of mentee to mentor to mentor to mentee gives practice in the process to create a successful and efficient balance between learner and leader. Further, the role that mentors can play in developing a mentee's professional identity as an engineer is vital and currently being investigated.*

Introduction

Mentoring, intentional or not, is a vital aspect of engineering education. It impacts highly on the process of engineering education at university, engineering practice in professional organisations and the development of the engineering workforce as a whole. In the past, differing systems of mentoring have been used in universities across Australia with a variety of results, some specifically targeting the use of mentors in engineering. A mentor has been described as “a wise and trusted counsellor or teacher” (Hoschette, 1995). Mentoring has been identified as one of the important education and training practices in the Capability Strategy Matrix (CSM) as seen in Figure 1. (Radcliffe 2006). In this model, it is an integral part of the knowledge and skills transfer system in both education and professional, workplace training that lead to “advanced engineering capability” (Radcliffe 2006: 1).

Student mentor and leadership program CQUniversity

The Student Mentor and Leadership program at CQUniversity was established in 1997 (Connor & McKavanagh, 1997) and links later year students with students who are new to the university. The aim of the mentoring program is to support new students in the transition to university life in order to minimise the attrition rates that are typically high at Australian Universities (McInnis, Hartley, Polesel, & Teese, 2000). The later year students who have ‘been there and done that’ volunteer to the program to mentor the first year students. They make initial contact with new students at the orientations on each of the domestic campuses and continue contact through emails and phone calls as the term progresses. These mentors can assist new students in becoming familiar with enrolment processes, course resources, and support services to ensure a smooth and less stressful transition into the university.

Capability Challenges	Collaborative Approaches to Capability Building					
	Work-Integrated Learning	Mentoring & Coaching	Knowledge Sharing	Innovation & R&D Networks	Cultural Change Programs	Community Engagement
<i>Changing Engineering Workforce</i>	Graduate & Professional Development Programs	Graduate & other Mentors Schemes	Staff Retention Schemes	Education Programs in CRC (and similar)	Industry wide PD Networks	Partnerships with community organisations
<i>Changing Engineering Practice</i>	Secondments in stakeholder / supply chain organisations	Cross industry or cross-sector mentors & Industry Networks	Communities of Practice (especially across industry sectors)	Embedded Researchers & Innovative Technology Diffusion Programs	Industry Networks, Industry-based Sabbaticals & Stakeholder Secondment Schemes	Strategic Industry Partnerships
<i>Changing Engineering Education</i>	Internships Innovative Vacation Work Programs	Industry mentor programs for students	Multi-institution Collaborative Education Programs	Professional Development Programs based on Innovation	Engineer-in-Residence Programs	School Outreach Program and Competitions

Figure 1: Capability Strategy Matrix (Radcliffe 2006)

The benefits of the mentor program are both personal and professional. It offers the satisfaction of helping peers and increasing the mentor's self-confidence (Miller & Kay 2002). The program involves a workshop before the orientation which introduces the mentors to skills in leadership, teamwork, problem solving, time-management, and communication. Interpersonal skills are put into practice in small group situations at the orientation and one-to-one in follow-up correspondence. All of these professional skills are highly transferable to the workplace, helping the students acting as mentors get a leg up into professional practice (Smith 2007).

Engaging students as mentors for younger peers is a way to start to develop these professional skills in a non-threatening but structured environment. The mentors can practice these skills and receive feedback in situations that are not critical to grades or job security but are real and valid none the less. The voluntary nature of the CQUniversity student mentor program means that the mentors do not feel under pressure to do the 'right thing' and so often end up doing work that is more beneficial and more thorough, and thus practicing their professional skills more. The structured nature of the program, which is coordinated through the Student Support Centre, ensures that adequate participation and motivation by each mentor is maintained. The requirement of formative checklists enables the monitoring of the amount of contact between mentor and mentees, without necessarily monitoring the content of the contact. Thus students feel obliged due to a sense of pride and duty, rather than forced and critically examined. This type of constructivist education is recognised as having more beneficial outcomes, and skills that are learnt and translated to behaviour that can then be used in later life and work (Smith 2007).

Mentoring also allows closer links with lecturers and staff and this gives exposure to academic, administrative and professional practices within the university environment. Examples of this are university policies, standards, quality assurance protocols and reporting. It is not just important to have technical recall in the engineering profession, but also to be able to find access to resources and to work within professional practice guidelines. The mentor training includes how to find, interpret and pass on information from these areas. This leads to a deeper understanding than simply reading about these practices. The interaction with staff and faculty also helps the students to appropriately interact with authority figures, administration, and people they do not know, and how to effectively communicate to successfully and efficiently meet the needs of all involved.

Professional Mentoring

In professional practice, workers benefit from being both a mentee and a mentor (Tesone & Gibson 2001). Mentoring programs have been established in many engineering companies including Hatch (King 2008), Thiess (2008), Sun Microsystems (2008) and AusIMM (2008). Professional engineering practice is difficult to learn out of context and especially in the classroom setting. Many engineers would not be able to 'tell' you what they do. It is a mix of technical, problem solving, interpersonal, management, and other skills, which are beyond the scope of definition. Mentoring is the best way to pass on knowledge of the practice *in situ* and incorporates all aspects that may be overlooked in a classroom setting. Also, the mentee is able to see examples of skills such as communication in an authentic setting and learn from following the example, rather than being 'told' what to do.

Transition from University to the Workforce

In the journey through university and then to the workforce and beyond, there are several transitions to make. Introducing mentoring at a student level makes many of the transitions easier (Miller 2002). The most obvious help is for the students who are new to CQUniversity. They receive personal help from peers when they need it most. Less obvious are the ways in which the CQUniversity mentoring program helps students transition to the workforce, and transitions upwards in their career.

Mentee to mentor

As new students to CQUniversity, the mentees are sometimes unaware of the benefits of the program. Within a few weeks, however, they realise what a valuable resource it was to have a mentor. Most mentees readily tap into the availability of the knowledge and advice.

It is this understanding of how potentially helpful mentors are that inspires the mentee to become a mentor. They know how hard it was in the beginning, and how much harder it would have been without a mentor. It is this cycle of understanding and passing on knowledge that makes the program work well. It is the metacognition and reflection of how they made it to where they are, through being a mentee, that makes them effective mentors.

Mentor to mentee

Having been a mentee and then a mentor while studying at CQUniversity, students are in an optimal position to embrace the role of mentee when they enter a large engineering company. Having previously been a mentee, they have had some idea what it is like to be new and need to ask questions and receive guidance. If the experience was good for them as a student mentee then that can directly translate to the work environment. If the experience was not optimal as a student mentee, then they may have developed more coping strategies to enable them to make the most of a mentor in a new position.

The experience of being a student mentor gives the student a perspective "from the other side" and can fully appreciate what it is like to be a mentor. They have experience with what kinds of questions achieve the best results from a mentor and what kind of communication to expect from the mentor. They can also appreciate more fully, the value of the knowledge that the mentor has to give and understands how to tap into that as a resource.

Mentee to mentor again

The transitions complete the cycle with the workplace mentee becoming a workplace mentor. Of course, having been a student mentor means that all that experience can be used in the new situation. The student, now as a workplace mentor may be more willing to give more to the program as he or she would feel much more confident in the role.

Mentor cycle model

The mentee to mentor cycle as described above, can be illustrated in Figure 2. The cycle starts clearly as a mentee as a new CQUniversity student. There is a defined line when the student becomes a mentor in the program and has the title 'mentor'. In the transition back to workplace mentee, due to the mentor experience, the line back to mentee becomes a little bit blurred. The new worker, however,

is still quite clearly a mentee. As the cycle continues through a person's life and career, the more experience that person has on both sides. The line becomes less and less clear, and the roles start to overlap. Thus the cycle ultimately culminates in a fuzzy place of being both a mentee and a mentor and doing each well and without thinking about boundaries between each state. As it has been said, everyone, no matter at what level, needs a mentor. It is also true that in life, you need to know how to be a good mentee in order to learn and succeed.

The fuzzy spot is the ultimate in good communication, successful career and professional balance between leader and learner.

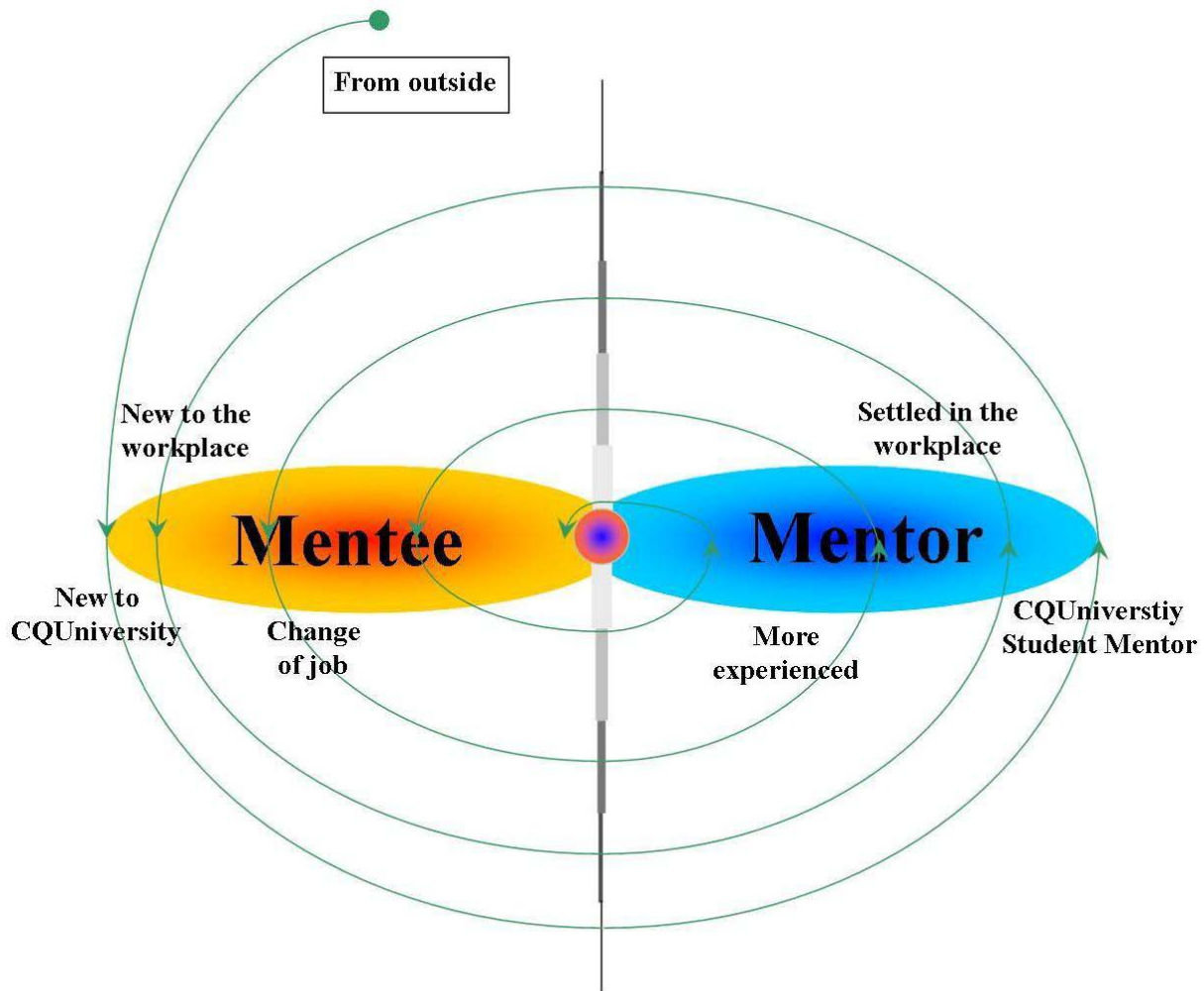


Figure 2: Mentee-Mentor cycle: CQUniversity to the workplace and beyond

Impact on Engineering Education

The impact that a mentor program can have on engineering education is great. At one level they have been proven to lower attrition rates and help entry students with the transition from high school to university life. More generally though, they help to develop in both the mentors and mentees an identity as an engineer. This identity development is part of an ongoing research project at CQUniversity which aims to understand how different factors contribute to developing an engineering student's identity as a professional identity. It is argued that it is this identity that allows the student to be more effective as a graduate engineer and is based on the concepts of identity (Gee 2000), accidental competency development (Walther & Radcliffe 2006) and self-efficacy (Hutchinson-Green, Follman & Bodner 2008). By understanding more fully the impact that a mentor program can have on developing a student's identity as a professional engineer, we can use this to develop better performing graduates in the future.

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