Enabling pathways by enabling cultural and value change in engineering academics

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ABSTRACT

Enabling pathways are often placed in the difficult position of establishing a bridge between engineering academic expectations and the quality and diversity of students seeking access to tertiary education. Difficulties in progressing to engineering programs may be in the form of articulation of fundamental maths and sciences. However, one of the main issues may not be an educational one but a cultural one; in that there is a cultural and value divide between students and engineering academics, which often are not adequately bridged. The proposition is that via improving scholarship of learning and teaching in engineering academics by collaborative development of curriculum with enabling educators, the cultural divide may be bridged. The paper looks to the examples in the experience of international students in enabling pathways and factors that hinder successful student progression in their respective programs. The paper endeavours to suggest propositions and relevant methods to address this, and provide tangible ways of delineating the barriers to effective transition in students, and provide positive change in the culture and values of engineering academics in particular.

1. INTRODUCTION

As world leaders continue to navigate around the global financial crisis and global recession, aspiring engineering students, especially international students, are under more pressure to perform in tertiary education to tackle their coursework to achieve a competitive edge over other graduates for employment. Historically, the progression and retention statistics for engineering programs across all Australian institutions has been poor; with less than a 50% completion rate (King, 2008a). Is it because engineering courses are harder, requiring more maths and science of which students are not well prepared? Engineering academics often comment on the degradation of the levels of maths and science knowledge and abilities of first year students (King, 2008a). The question can be asked, "Why do they need the "hard-core" maths and science at the first year level? Or do they?", "Would students be able to "catch-up" if the core fundamentals were embedded within the curriculum?"

Traditionally, engineering academics have been solely expected to teach the "standardised" technical engineering content as part of the curriculum. Academics may now have to rethink their paradigm on engineering curriculum and the proposed students' learning journey. Faced with the dynamic nature of the engineering profession, engineering academics are faced with the pressure of enculturating students in the dynamic and expanding curriculum requirements (Goh, 2007). In response to this pressure, many first year "enabling" courses have been left out of the program in favour of more relevant technical knowledge and graduate skills; "Enabling" for the purpose of this paper is defined as foundational and preparatory activities (involve both skill-based and knowledge-based) that provides a basis for entry to tertiary studies. This scenario has created a further divide between enabling programs and first year engineering studies. This paper is intended to initiate further discussion and research into this important area of enabling scholarship but also to highlight the suggested reason for this scenario; namely, the cultural and value divide between students and academics; "culture and values" for the purpose of this paper is defined as a manifestation of a set of attitudes, beliefs, perceptions, and purpose(s).

2. SCENARIO & RATIONALE

Engineering education continues to be a national priority in addressing Australia's skill shortage and the quality of graduates (King, 2008a). Engineering education in the past has often been confined to traditional and discipline-driven technical programs offered by engineering faculties accredited by Engineers Australia (Institute of Engineers Australia, 1996). Often, there is a constant struggle to influence between the tertiary institutions and professional authority/industry in the leadership of curricula and its pedagogy. In recent times, the popularity of multi-disciplinary engineering curricula driven by environmental change in skill requirements has presented fluid transitions in the leadership of these programs between technical disciplines within institutions and professional authority/industry. Curriculum reform and engagement are also listed as priorities in the recent held 'Leading Change Symposium 2008' (Hicks, 2009). The suggested barrier in this curriculum reform scenario is that of a cultural and value divide between the engineering profession and engineering academics.

While engineering faculties have attempted to react to the changing nature of the engineering professional by collaborating with various stakeholders and to cope with the declining staff-student ratios in often under-resourced faculties, employers and professional authority complain of graduates not being "work ready" and their ongoing continuous professional development are poorly catered for by the tertiary postgraduate sector (Institute of Engineers Australia, 1996; Hicks, 2009; King, 2008b; Nair & Patil, 2008; Roberts, 2007). Some positive outcomes in selected pockets have recently arisen from collaborative work between individual disciplines and industry, often heavily sponsored by the latter, such as the Australian Power Institute and Mining Education Australia (King, 2008b). On the surface, it seems that the respective bodies are attempting to address such concerns fairly collaboratively, though the resultant outcomes at the 'coal-face' of engineering education are often quite independent due to a number of reasons. A core inhibitor is a difference of culture and values, and somewhat indifference to the notion of collaborative problem solving. At the interface of university and other stakeholders, there are significant differences in the cultures and values in approaching the issue of life-long learning of engineering professionals.

Roberts (2007) identified that a variety of communities-of-practice have contemplated, even challenged, the relationship between academia and industry. Roberts said "… Academic purists believe that higher education has as one of its primary missions, the acquisition and dissemination of knowledge as an end in itself, focusing on acquiring knowledge, not necessarily on learning to use it…" Furthermore, it is argued that higher-learning institutions should be able to advance the thought-space without the pressures of commerce and capitalism (Roberts, 2007; Etzkowitz et al, 1998). Conversely, the professions who believe that it takes a 'village of experts to train an engineer' (Roberts, 2007; Bosley, 1995), warn

that the 'Ivory Tower' is no longer an optimal or sustainable model for education (Roberts, 2007; Etzkowitz et al, 1998). In Bosley's (1995) view, "the value of knowledge and research is related directly to the market value of the products it produces". Roberts reiterated the perceived cultural divide by saying that "…individual research contributions, publications, and grant funding are often viewed as greater accomplishments than facilitating creative collaborations."

The same can be said of the divide between engineering educators and enabling educators (and their students). There are tertiary preparatory programs that are designed to prepare students to be better equipped and prepared for their engineering degrees. However, it can be argued that the "successful" transition rate can be further improved by measuring and bridging the cultural and value divide between enabling educators and engineering academics; this is an area potentially rich in research opportunities. It is envisaged that a two-steps study is required; engineering academics vs enabling academics.

As a first step, the proposition in this paper is focused on the divide in the expectations, learning styles and skills between engineering academics and their students on the enabling curriculum (Felder & Silverman, 1988); this will be a basis for further work on bridging the cultural and value gap between engineering academic and enabling educators. By providing a measurement of expectations, perceptions and learning style in engineering academic and its relationship with learning and teaching scholarship, particularly in enabling scholarship, tangible and evidence-based strategies to enable cultural change in academics are then possible. To devise an intervention process, measurement of the attitudes, beliefs, and purpose(s) is also required. One focal point discussed in this paper is on enabling education of a diverse cohort, and in particular, international students. There are a number of cultural and value gaps that exist between engineering academics and international students; and these are described further in this paper.

3. PROPOSED METHODOLOGY

One method proposed to foster enabling scholarship is in the leadership development in learning and teaching scholarship of engineering academics in a collaborative environment. Ramsden (1998) suggests positive change in culture and values can be promoted by leadership development. This can be facilitated by developing an effective partnering framework between the various stakeholders to foster curriculum renewal in relations to enabling scholarship. This approach is similarly analogous to Creedy & Henderson's (2009) ALTC (Australian Learning and Teaching Council) leadership project "Leading for effective partnering in clinical contexts" (LD614), though it will be different in context, approach and outcomes. The proposed approach complements Nagy, et al. (2009) in their leadership project "Coalface subject coordinators – the missing link to building leadership capacities in the academic supply chain". It also advances on prior work in addressing issues identified in Emeritus Professor Robin King's (2008a) ALTC sponsored Scoping Report "Addressing the Supply and Quality of Engineering Graduates for the New Century". He said, "Engineering educators and industry practitioners must engage more intensively to improve the authenticity of engineering students' education." This action-based research methodology using engagement tool can be used to bridge the divide between engineering academics and enabling educators (and their students).

Any such curriculum renewal would be ineffective in the long run without addressing the cultural divide between the various stakeholders. Hargreaves & Evans's (2008) work on "Value Driven Leadership – A Journey" is an inspirational read for the engineering profession, and can be translated into not just personal leadership but institutional leadership. The goal in this proposition is to translate often very effective individual values to mature and manifest into an organisational culture. Often, the various stakeholders will have established and entrenched culture and values. These present hurdles for sustainable change in engineering academics (vs enabling students). Thus, a sustainable structure and processes in the form of a leadership model addressing this issue is required.

Ramsden's (1998) book *Learning to Lead in Higher Education* has been a favourite of ALTC leadership applicants in the past, and is of particular focus in this proposal. Its proposition is particularly focused on the departmental level rather than at institutional level, and proposes to use research-based evidence to develop models of leadership and practical strategies. Ramsden described academic leadership simply as "… a practical and everyday process of supporting, managing, developing and inspiring academic colleagues" and that "…leadership in universities can and should be exercised by everyone, from the vice-chancellor to the casual car parking attendant. Leadership is to do with how people relate to each other." Ramsden is assuming that leadership is inherent in organisations though it is rarely a matter of chance when change and improvements are made. Someone must have been influential. Therefore, value-driven leadership (Hargreaves & Evans, 2008) has a role to play in moulding organisational culture and values. Ramsden (1998) points out that if leadership is to be effective, universities need to sidestep a series of errors associated with single models of academic excellence, teaching and research, human resource management, structure and process, and to not overtly rely on regulations and processes but of leading in effective organizational culture and values.

This proposition aims to enhance ownership of, and responsibility for, development of curricula through a sustainable framework via positive cultural change. This can be achieved by measuring the expectations, learning styles and skills with reference to learning and teaching scholarship, and devising and implementing an engagement-driven leadership-based intervention process via measuring the attitudes, beliefs and purpose(s) of the engineering academics. The proposed model should be designed around ongoing dialogue around emerging and existing curricula themes between relevant parties; engineering academics, enabling educators and students. Ongoing dialogue between the relevant stakeholders will help to make learning and teaching practices more relevant and more appropriate to enabling students. It can employ a 'learning circle' model (focus group discussions which lead to communities of practice and subsequent conferences) as a conduit to develop leadership capacity and promote quality and relevant engineering-enabling education. Communication and engagement through learning circles will help to create a positive culture for shared vision and discuss issues in productive and collegial ways at the 'coal-face'. Though the physical outcomes in curricula improvement in terms of enabling education are crucial parts of the proposition, the main drivers will be a potential bridging of any cultural and value divide, and on the assessment of learning and teaching leadership developed during the intervention process.

4. PREPARATORY PROGRAM AND INTERNATIONAL STUDENTS

Many Australian tertiary institutions provide a special course which qualifies international students for Australian tertiary education entrance and addresses their special needs. For example, as a bridging program, USQ currently offers UNIPREP (University Preparation Program) or FSP (Foundation Studies Program), and Tertiary Preparation Program. Of all these programs, the UNIPREP and FSP courses are enabling tertiary preparation programs especially designed to help international students make a successful transition from their previous school environment to Australian tertiary institutions. Eckert (2004) notes that international students need to adapt their approach to learning to acquire the study skills necessary for successful tertiary education study in Australia. She emphasise the research findings of Wright (1982) on the differences between study skills required at university level and study skills at high school level. For example, new students at the university level often are unsure of what exactly they have to prepare. They also tend to continue applying inappropriate study skills to their tertiary courses. With regard to this, Weiland and Nowak (1999, p.6) argue that 'the host culture mainly determines what is learned, how it is learned, the modes of communication for learning and motivation towards learning and communication in general'. They also emphasise that 'language and general adjustment are not great problems. However, cultural differences do have a considerable impact' (p.3).

This section defines the discursive problems of international students who are enrolled in enabling pathway programs offered by Australian education programs. A summary of the anecdotal evidence and important statements from previous research are then presented in order to develop and support the design of possible further research in this area. With regard to the issues of the research, there are two main analytical frameworks that could be considered to underpin the study, namely cross-cultural communication and adult learning as applied to the academic context. These are determined by critically reviewing what is known about the cross-cultural factors impacting on those students and enabling cultural and value change in engineering academics in particular. These frameworks enable one to better understand students' learning experiences in Australian tertiary education, the demands of cross-cultural adaptation, and the difficulties they experience in terms of the reality of the academic context required by all fields of their study, including engineering.

The problems faced by international students and their difficulties while studying in the Australian education environment have been addressed to some extent in a number of previous studies (for example: Altback 1991; Anderson 2001; Ballard 1989; Ballard & Clanchy 1997, 1992, 1988; Barnet 1994; Biggs 2001, 1990; Coventry 1998; Gassin 1992; Hughes 2002; Hellstén 2002; Malcolm & McGregor 1995; Philips 1994; Rambruth; Yazbeck 2003; Park 2006). These works focused on the problems experienced by international students, mainly from language backgrounds other than English, and have attempted to explain their difficulties. Bradley and Bradley (1984) reported that the key issues they focused on were mainly categorised into the areas of language difficulties and cross-cultural issues (learning to operate in a new language and in a different cultural learning environment). However, As Hofstede (1986, p.314) states: "language is the vehicle of culture and it is an obstinate vehicle. Language categorizes reality according to its corresponding culture". Previous research shows that linguistic problems and cultural variations tend to occur at the same time, and they constitute a unique problem that normally comes about by means of reciprocal action between these two components.

In fact, the issue of many international students encountering all sorts of unexpected problems with their studies in Australia began to be actively considered by researchers from the late 1980s because Australian government education policy, shifted from 'Aid' to 'Trade'. In relation to this, Williams (1989, p.15) states that 'the surge of interest within the Australian education sector in the recruitment of students from overseas has been driven in large measure by the financial advantages for the institutions, an attitude actively promoted by the Australian government'. This fact was simply because lower government education funding during that time pushed many tertiary institutions even further to undertake market development in order to gain income from international students. This challenge was rapidly taken up by ELICOS program institutions and a few universities and colleges began to target and recruit full fee-paying international students (Park, 2001, p. 55). The expanding number of international students (mainly from Asian countries) in Australian educational institutions from the late 1980s led to a need for many academic teaching staff to be concerned about overseas students' unexpected problems and to be informed as to how these students faced English language difficulties and cross-cultural adjustment to a new Australian academic environment.

Ballard and Clanchy (1988) undertook a broad analysis of the difficulties with English that many overseas students faced while being in a different culture. This was mainly based on the researchers' work experiences with all levels of students mainly from Asian countries who were enrolled at the Australian National University. Their findings revealed that linguistic difficulties and cultural differences are not the only problems such students encountered. There are four important aspects that Australian teaching staff and overseas students themselves had not previously recognised. These include how students approach study, different styles of learning, different ways of developing arguments, and presenting ideas in a new academic context. They also argued (p.27) that 'the move to tertiary education, in particular to university education, involves an important shift to a new approach to learning-the analytical approach'. Ballard and Clanchy also described cultural attitudes to

learning strategies and provide a framework that is relevant to all education systems. However, these cultural attitudes to learning are manifold from one country's education system to another. One of the major issues facing international students in Australian tertiary education programs is how to adapt to such transitional changes in patterns of learning styles. For instance, Ballard (1989, p. 42) stated these problems mainly result from 'a mismatch between previous educational experience and what is now expected' (as cited in Anderson, 2001. p.2).

Considering the significant values embodied in the different learning styles, Anderson (2001, p.8) concludes that "one of the most important issues for teachers is the understanding of their own preconceptions and stereotypes of students' cultures". Anderson additionally argues that with a continuous growth in the number of international students' participating in Australian academic programs, it is important that academics need to minimise stress arising mainly from language and cultural barriers by developing appropriate strategies to produce effective cross-cultural communication skills and effective learning and teaching environments for international students. In another study, Biggs (2001) identifies the point that international students' learning difficulties mainly arise from the stereotyping of an incoming student's own cultural background. He argues that full engagement with the Western learning culture is a crucial factor about which international students need to be concerned so as to achieve their goals. For example, he points out that students from Asian countries have difficulties in changing patterns of their learning styles which are grounded in their cultural values, beliefs and practices in their home countries. Hellstén (2002) cites evidence that some international students can be characterised as 'passive' learners who make no contribution to class discussions and debates and may even be considered to lack knowledge of the importance of the ban against plagiarism in the Australian academic context. Hellstén (2002) argues that learning difficulties of international students in the Australian academic context emerge if confronted with a lack of concern or no facility to cater for them. He suggests (p.12) that 'student mentoring' programs may be one appropriate facility to support international students, stating 'the effect of these programs is the availability of guidance provided by more experienced students who act as 'mentors' to incoming new students'.

The research conducted by Brooks and Adams (2002) involved LBOTE students in their first year of academic work in a business program at Macquarie University. They pointed out that 'international students had lower levels of frequency in using English than local students, and their academic assessment also was not as high as local students (2002, p. 4). Cho (2001, p.3) states that 'students may or may not be aware of deviations'. Furthermore, a lack of knowledge of the Australian academic context is usually a more serious problem than students expected. For example, international students are not accustomed to writing tasks in many different genres. It directly affects international students' ability to cope with the Australian academic context. Todd (as cited in McNamara & Harris, 1997, p.176) points out that 'some lecturers characterize the learning strategies of overseas students as relying on rote learning and memorization', referring to students from non-English backgrounds. This leads to the understanding that Asian countries' school pedagogies depend heavily on passive learning and 'a cramming system' of education. It can thus be seen that a change in teaching style could lead international students to experience major difficulties, such as being unable to participate in class discussions or to think critically and analytically (Todd as cited in McNamara & Harris, 1997, p. 176). Cho (2001, p.316) argues that 'the main difficulties students encounter while studying abroad involve not only acquisition of English language but also the way language is used in the academic context'. For example, international students are confronted with variations in terms of interacting with lecturers, tutors and local Australian students in the class. Students are generally asked to prepare presentations and participate in class discussions. However, Cho (2001, p. 321) states most students were not aware of different socio-linguistic rules relevant to this new study genre, involving matters such as how and when to speak in classes. These were some of the norms they needed to acquire, and a lack of familiarity or exposure to these norms could make them less active in class'. It is an important task, therefore, for academics in Australia to

study how best to assist international students to undertake appropriate strategies in the Australian academic environment.

While there are many dimensions in which cultures vary, one that has received consistent attention from cross-cultural communication practitioners is individualism as opposed to collectivism. To the individualistic Australian, the conflict management process is described by verbal expressions, "to clarify one's opinion, to build up one's credibility, to articulate one's emotions, and to raise even objections if one disagrees with someone else's proposal" (Ting-Toomey, 1997, p. 8). According to Kim (1997), "many short-term sojourners' contacts with host cultures are mostly peripheral and, many of their previously held beliefs, taken-for–granted assumptions, and routine behaviours are no longer relevant or appropriate". In his notion of adapting to a new culture, strangers gradually manage to achieve a new level of learning and self-adjustment that helps them accommodate to the demands of the host cultural environment. It means that strangers try to modify their cognitive and affective behaviours through the process of the "stress-adaptation-growth dynamic theory." In this theory, adapting to a new culture can be described as "arrow-like linear progression, but in a cyclic and continual 'draw-back-to-leap' pattern similar to the movement of a wheel" (Kim, 1997, p. 2). Adaptation is an interactive process involving both strangers and the host cultural environment. Members of the host country, therefore, need to actively encourage strangers to adapt through providing suitable programs making it possible to merge the incoming new sojourners into a cohesive social environment with the host culture. This theory relates well to Vygotsky's idea of the importance of 'social interaction' as a part of cognitive development.

International students' experiences in terms of cross-cultural difficulties and problems could also be analysed according to the results of Hofstede's (2005) power distance index and his associated theory. According to the power distance index, international students, particularly from East Asian countries, were accustomed to behaving in the large–power-distance environment. Hofstede (2005, p.55) argued that 'in the large-power-distance situation, superiors and subordinates consider each other as existentially unequal; the hierarchical system is based on this existential inequality'. As key differences between collectivist and individualist societies with regard to language, personality and behaviour, Hofstede (2005, p.97) stated "students in a collectivist culture will also hesitate to speak up in larger groups without a teacher present, especially if these are partly composed of relative strangers, or out-group members". Considering the issues of different gender, Hofstede (2005) indicated that students in masculine oriented cultures were not allowed to express aggression. This implies that international students' could have difficulty in the discussion-based learning system in Australian undergraduate programs. Hofstede (2005, p.179) notes that 'students from strong uncertainty avoidance cultures expect their teachers to be the experts who have all the answers'. This intellectual disagreement or difference in Australian tertiary academic matters is frequently faced as a variation between the two different educational cultures. Furthermore, the Australian Vice Chancellors' Committee "Code of Ethical Practice for international students" recommends a policy of acculturation and states that "international students, to maintain standards of academic excellence, need to adapt to the dominant culture (which will promote) successful adjustment by international students to life and study at any Australian university" (cited in Davis and Olsen, 1999. p. 99). The meaning of acculturation in this context can be understood by recent research conducted by Hofstede and Hofstede's (2005 p.13) emphasis on defining the rules of the social game. They state that "we need to fit in, to behave in ways that are acceptable to the groups we belong to".

A seminar paper by Hellstén (2002) argued that insights into ways of realising the many problems faced by students from overseas and their transition into a new Australian academic setting are very important issues that relate to teaching and learning pedagogy. Her research explored various aspects of international students' difficulties with socio cultural adaptation, adjustment strategies, English language usage, and communication. The main aim of her study was how to deal appropriately with the problems international students face in the Australian academic context. Her research suggests the necessity for curriculum

development to address the issue of how to prepare and implement a positive international education environment in Australia. The central statement in her research is that the problems international student encounter are more serious than Australian academics might expect and this implies a need for them to be more carefully concerned about establishing a viable international curriculum.

5. CONCLUSIONS

Cultural and value differences between engineering academics, enabling academics and enabling students are arguably one of the core inhibitors of successful retention and progression for the increasingly diverse cohort of engineering students. One of the main educational issues that needs to be addressed in most institutions concerns the development of scholarship of learning and teaching of academics; the individuals that deliver courses. However, it is argued that the benefits of such development of academics cannot be fully realised if it was delivered without addressing the influence of culture and values. Enabling education are often placed in the difficult position of establishing a bridge between engineering academic expectations and the quality and perceptions (including learning styles and skills) of students seeking access to tertiary education. This paper has illustrated a scenario that suggests urgency for curriculum renewal in engineering education. However, it can be argued that any positive curriculum change will require a change in the culture and values of engineering academics. This paper looks to the experience of international students. It has made reference to anecdotal evidence indicating that international students who are enrolled in enabling tertiary preparation programs and who completed these courses still refer to problems with English language usage in academic context and cultural variations in Australian tertiary education. This paper has examined the importance and the need for an analytical framework, and relevant theories as a basis to conduct this research. It is envisaged that as an outcome of positive cultural and values change via the intervention process, it is reflected in leadership development in the various stakeholders; in particular, engineering academics. As a derivative, it may result in a bridging of the gaps between enabling programs and first year programs via collaborative curriculum development. Lastly, it is hopeful that this study may lead to the provision of some tangible ways of delineating some of the barriers to enabling education of prospective engineering students. It is hoped that this paper has generated interest, further thoughts and propositions, and relevant methods to address the scenario described in this paper.

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