



Creating the reasonable adventurer: the co-evolution of student and learning environment

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Abstract

Purpose – This paper seeks to address the issue of *how* graduate skills are developed. The focus is not on *which* skills, but rather what type of learning environments are required within higher education to support the development of skills valued and demanded by SMEs within Australia.

Design/methodology/approach – This paper takes a step back to consider the underlying issue of how an individual student's habits of thought are altered. In doing so, the past works of Morgan, Dewey, Whitehead, and Tyler are synthesized with the modern work of Baxter Magolda, Heath, and Biggs.

Findings – It is argued that that without the development of a student-centred learning environment, most graduates will not develop the types of skills demanded by SMEs in a meaningful way. The failure to treat knowledge and skills as equal drivers of curriculum design will result in an imbalance that relegates skill development to a secondary learning outcome.

Practical implications – By removing the distraction of *what* skills should be developed, a clearer focus is possible regarding how educators should assist students to develop a broad array of generic graduate skills. From this perspective, skills can be viewed as an essential element of the educational process, rather than a new element that must be squeezed in between content.

Originality/value – This paper extends recent discussion of skills development through the use of an evolutionary perspective. Viewed as a process of creating social change, education becomes increasingly connected to a world that lies beyond institutional boundaries, thus promoting the notion of developing graduates for the world that awaits them.

Keywords Graduates, Self development, Small to medium-sized enterprises, Australia

Paper type Research paper

Introduction

The every increasing importance of SMEs to all global economies and the increasing responsibility of Universities to ensure the availability of *skilled* graduates to SMEs are universally acknowledged. What is less accepted is the ability of the higher education sector to effectively assist students develop lifelong skills (Matlay and Mitra, 2002). Rather than add to the growing literature related *what* skills should be developed; this paper aims to focus on *how* any such determined skills could (and should) be developed. In doing so, this paper returns a focus to some specific educational issues that receive less discussion (perhaps) due to the existing confusion of what skills should be developed. However, the position of the author is that many SME specific skills will be developed on the job, and what is important is that graduates have a capacity for learning additional skills beyond a broad base of skills applicable to all types of employment. This view is based on recent past development of the National Employability Skills Framework (NESF) in Australia, which was founded on the



findings that large, medium and small firms all increasingly demand graduates with a similar skill set. These skills are illustrated in Table I.

While the NESF provides for a *general*, but *transferable* skills set, it also provides a focus on the nature of the requirements that students must satisfy in order to claim mastery of each skill. Therefore, there is a clear onus on higher education institutions guided by such frameworks to employ authentic assessment (Wiggins, 1989) procedures to determine student developmental outcomes – a particularly salient point given the increasing level of activity across Australian universities to embed graduate attributes across all courses. This paper is structured as follows. First, the notion of a reasonable adventurer (Heath, 1964) is considered and proposed to be a universally attractive type of graduate student. Then, related self-developmental issues are considered, allowing a more fine-grained focus on how students must change to incorporate new habits of thought (Veblen, 1925). Following this is a discussion of the process niche construction (Olding-Smee *et al.* (2003), through which the co-evolution of

Skill	Requirement	Exemplars
Communication	Contribute to productive and harmonious relations between employees and customers	Listening & understanding; empathising; negotiating; using numeracy effectively; writing to the needs of the audience; sharing information; and reading independently
Teamwork	Contribute to productive working relationships and outcomes	Working with people of different ages, gender, race; working as an individual and/or team member; coaching, mentoring and giving feedback
Problem solving	Contribute to productive outcomes	Developing creative, innovative and practical solutions; solving problems in teams; applying a range of strategies & initiative and independence to problem solving
Initiative and enterprise	Contribute to innovative outcomes	Adapting to new situations; being creative; translating ideas into action; generating a range of options; initiating innovative solutions
Planning and organising	Contributes to long-term and short-term strategic planning	Managing time priorities; being resourceful; taking initiative and making decisions; allocating people and other resources to tasks; collecting, analysing and organising information; and developing a vision and a proactive plan to accompany it
Self-management	Contribute to employee satisfaction and growth	Having a personal vision and goals; evaluating and monitoring own performance; articulating own ideas and vision; taking responsibility
Learning	Contribute to ongoing improvement and expansion in employee and company operations and outcomes	Managing own learning; contributing to the learning community at the workplace; using a range of mediums to learn – mentoring, peer support, networking, information technology courses
Technology	Contribute to the effective execution of tasks	Having a range of basic IT skills; applying IT as a management tool; using IT to organise data; being willing to learn new IT skills

Table I.
National employability
skills framework

student and learning environment is claimed to be possible. The paper concludes with a synthesis of the concepts discussed drawing out implications for educators involved in the development of skills in the higher education area.

Towards the development of students capable of independence

Rather than separate skills into personal or business (McLarty, 2005) or any other array of categories (e.g. transferable, core, etc), this paper begins with a different issue. A question not related to what skills, but rather a question driven by a curiosity in how skills are developed. How is it that some students are capable (more so than others) of coping with change, identifying and exploiting opportunities and being able to reconcile the known with the unknown? This is a question not distracted by the potentially never-ending list of SME related skills. This question returns a focus to the generative mechanisms through which future graduate interaction in a SME world is determined. Whilst there are many competing definitions of generative mechanisms, Mahoney's (2003, p. 4) extensive review of generative mechanisms views "causal mechanism[s] as an unobserved entity, process, or structure that acts as an ultimate cause in generating outcomes". Within the context of this paper therefore, generative mechanisms are the students' habits of thought, which are plastic enough to be self-altered through frequent reflection.

In his study of Princeton undergraduates, Heath (1964) identified six specific attributes through which a student's ability to create their opportunities for satisfaction were enhanced. Let us consider each briefly to outline the nature of how each might relate to skills frameworks, such as the NESF. The first attribute is *intellectuality*, the ability to alternate between being a believer and a sceptic – an ability to remain curious whilst determining what matters through making connections between the object under consideration and the reality of their world. The second attribute is *close friendships*, or the ability to discover the individuality of others – the realisation that they have shared feelings with others and that prior perceptions have been altered due to these friendships. The third attribute is *independence in value judgements*, or the ability to rely upon personal experience rather than known external authorities. This increased reliance upon one's judgement provides an avenue towards self-reflection that may be travelled with much vigour and enthusiasm. The fourth attribute is a *tolerance of ambiguity*, or the ability to view life as a series of interruptions and recoveries (Dewey, 1922), to be able to suspend judgements until sufficient information is obtained to make the right decision. The fifth attribute is the *breadth of interest* demonstrated. Heath (1964, p. 34) calls this an "uncommon interest in the commonplace". So depth replaces breadth to enable the sustained pursuit of specific problems. The last attribute is a balanced *sense of humour* – a benign, but lively sense of humour that distinguishes the reasonable adventurer, making he or she good company, and capable of being sensitive towards others across conflicting circumstances.

So Heath (1964) promotes the idea of a fully functioning graduate, one that is capable of using his or her individuality in ways that are beyond their pre-existing mental endowments. The key is the fact that he or she is tethered to the reality of their world, yet capable of finding deep satisfaction from the ingredients of their raw life. This outline of the reasonable adventurer forms the author's ideal minimal outcome for

any graduate, be they destined to employment in a large firm, a SME, or self-employment. It is the contention of this paper that the reasonable adventurer concept is the chassis around which other features (i.e. skills) can be fashioned, and is the primary structure upon which the journey into the future is possible. It represents a state of development without which, all other attempts at skill development will be merely *add-ons* to an inferior model of graduate.

The challenge of facilitating the development of the reasonable adventurer is not limited to program design. It is unlikely that any program that works in one university would deliver identical results in another due to resource and personnel differences. So, the focus proposed here is upon the underlying processes related to *how* any such self-development is possible. Be that towards the reasonable adventurer concept by itself or with an extended focus to include specific SME skills. As noted by Jones (2005), enabling students to experience the type of learning environment required for such educational outcomes also provides the opportunity for the development of a skill set that is increasingly demanded by Australian SME (and larger) employers. Described "as the 'third leg' of the university sector, alongside teaching and research" (Hartshorn, 2002, p. 150), the development of enterprise skills is a genuine outcome in its own right. Whilst it may be unrealistic (and not possible) for universities to guarantee (Clanchy and Ballard, 1995) that all students will graduate with a specific skill set, this however does not prevent universities from guaranteeing that undergraduates will have the opportunity to attempt such self development (Crebert *et al.*, 2004). Therefore, this paper aims to throw some light on the underlying processes through which any such graduate development is possible.

The challenge of self-development

Free from the constraints of what skills should be developed, we now have created sufficient space to consider the process of self-development required to support the acquisition of any particular skill set. In work that presents similarities to Heath's (1964) research, Baxter Magolda (2004) promotes the self-development concept of self-authorship. Through her work, a journey of self-discovery is outlined through three specific dimensions, the epistemological, intrapersonal, and interpersonal. Baxter Magolda defines self-authorship as "the ability to collect, interpret, and analyse information and reflect on one's own belief in order to form judgements" (1998, p. 143). Whilst the connection between self-authorship and the reasonable adventurer concept should soon become self-evident, the discussion will now deliberately wander further away from skills development, to go deeper into the nature of the cogs and wheels of the generative mechanisms that will eventually determine the nature and longevity of acquired skills. The value of this digression while emerge once the concept of niche construction is also considered.

Before we proceed further, a brief recap of the main points discussed so far. What has been claimed thus far is that an over emphasis on *what* graduate skills are relevant to SMEs appears to have prevented a more explicit focus on *how* any such skills can be developed in the higher education sector. It has been suggested that if we go back further, we can focus on what process of self-development is required to provide a sufficient base upon which specific SME skills can be more profitably developed. To this end, Heath's (1964) concept of the reasonable adventurer has been introduced to

highlight a degree of attainment suggested to increase the successful acquisition of any specific skill set. The paper will now proceed with an overview of Baxter Magolda's (2004) proposed concept of self-authorship. In doing so, this section aims to highlight several specific personal development issues that cannot be ignored and must be factored into the design of any educational program designed to develop SME skills.

Let it be stated that the author concurs with Tyler's (1949, pp. 5-6) assertion that "education is a process of changing the behavior patterns of people. This is using behaviour in the broad sense to include thinking and feeling as well as overt action". Clearly these three forms of altered behaviour can accommodate aspects of critical thinking, self-reflection and skill development. The first aspect of this approach relates to the way in which our students know what they know. Baxter Magolda (2004, pp. 17-18) describes four phases through which students typically are required to move in order to develop a capacity for self-authorship. She proposes the need to move "from absolute knowing (in which knowledge is assumed to be certain), through transitional knowing (in which some knowledge is believed to be uncertain), to independent knowing (in which knowledge is assumed to be largely uncertain)" to "contextual knowing (in which knowledge claims are made based upon relevant evidence within a context)". Building on Perry's (1970) theory of evolving adult epistemological structures, the central driver is personal reflection from which meaning of experience is developed. Essentially, developing the ability to construct one's own knowledge rather than merely taking in the knowledge of others (Belenky *et al.*, 1986).

However, the challenge that confronts all educators is dealing with different rates of learning and development across individual students (Weimer, 2002). Given that students develop incrementally, it would seem logical that learning activities designed to aid such development should also work through sequential design. While this idea has intuitive appeal, Weimer notes that little research has been conducted to support such a notion. Nevertheless, holding this thought a little longer provides the cue to introduce the concept of niche construction. The concept of niche construction provides an interesting lens through which to consider student developmental issues. Specifically, it provides clues as to how each students' habits of thought (i.e. the generative mechanisms) may be self-altered.

Niche construction

The process illustrated in Figure 1 is an adaptation of Olding-Smee *et al.*'s (2003) niche construction process. These authors in championing the neglected process of niche construction bring to life the previous work of Lewontin (1983). Lewontin sought to refute the assertion that an organism proposes (a set of predefined) solutions to the problems it encounters in its environment, and that the environment then efficiently rewards or punishes those solutions that prove beneficial or injurious to the organism. For Lewontin, any explanation of the process of adaptive change must cater for the ongoing reciprocal interaction between the organism, its generative mechanism and the environment. He asserted that organisms determine relevance, alter their external world, and transduce physical signals from their external environment. Essentially, rather than merely being on the receiving end of natural selection, organisms both make and are made as a consequence of interaction with their environment.

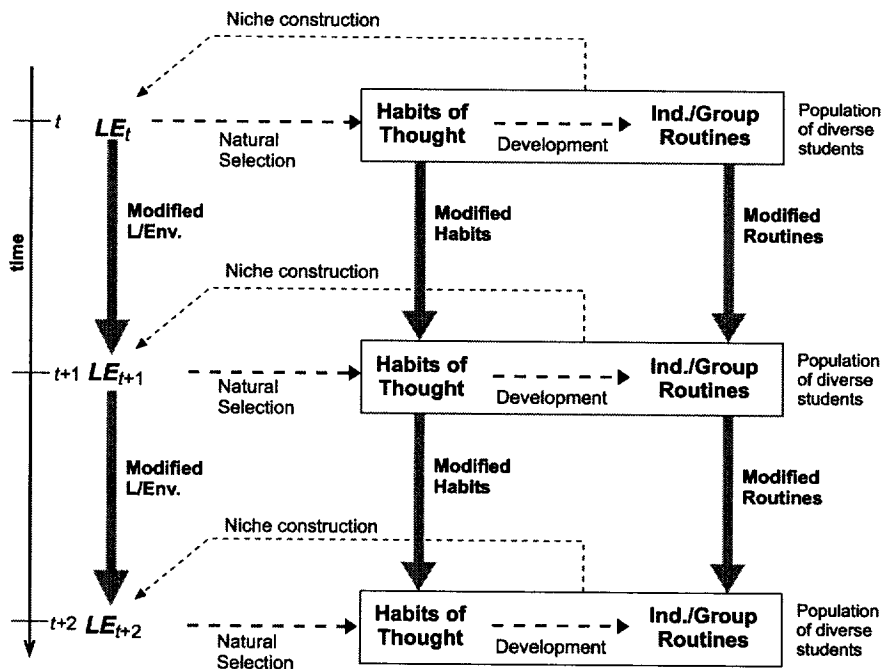


Figure 1.
The proposed causal
pathways of niche
construction

Developing this line of thinking, Olding-Smee *et al.* (2003) again cast doubt on the conventional view that organisms adapt to their environment, but environments do not adapt to their organisms. From an educational perspective (as observed by the author), this conventional view would assume that student interaction within a particular learning environment would result in the sorting of students by specific (learning or skill) traits as ordered by the assessment procedures they encounter – that, while some students may improve throughout the process, the learning environment would remain unaltered through such interaction. It is highly likely that such a process could occur through the application of a lecturer-centred approach complete with reliance upon norm-reference assessment procedures. However, within this paper the process of teaching and learning is considered from a learner-centred perspective.

In Figure 1, it is assumed that change internal to the student (i.e. habits of thought) and its behavioural expression (i.e. phenotypic expression) is possible due to interaction with a learning environment (LE). The illustrated process begins with the interaction between a student as an individual and as a group member within the learning environment (E_t). During this first period of time, each student and his or her group will engage in various learning activities, which will be assessed using both summative and formative feedback. During the process of assessment, the fitness of the routines used individually by each student and by his or her group will be assessed. Such routines represent the activity systems responsible for phenotypic expression (e.g. the content and context of the student's/group's performance and associated identity projected for consumption).

As a consequence, the habits of thought of each student are subject to differential selection (for or against) on the basis of their contribution to the phenotypic expression of the individual and/or group. A combination of freedom (Whitehead, 1929) and reflection (Tyler, 1949) then provide the means through which the group, and therefore individuals, may alter behaviours via a shift in their collective and separate habits of thought. This process of group and individual change is facilitated in the first instance by the summative information received (i.e. a grading) and then by the formative information that relates to both negative and positive aspects of the group's/individual's performance. Therefore, the various assessment procedures used act as selection mechanisms.

This process of generating both summative and formative assessment performs two important functions. First, the summative feedback provides an indication of the immediate fitness of the group's/individual's performance *vis-à-vis* the performance criteria at a particular moment in time. Second, the formative feedback provides feedback through which future change is possible. So the "difference between them is that at some point the judgement has to be final" (Biggs, 2003, p. 142). The other factor that influences the composition of the interacting elements is that of the internally held perceptions within the group that may be altered to produce many different outcomes. So, three forms of inheritance are possible and likely throughout this process.

First, the students' habits of thought (derived from their habits of life) are subject to revision as they determine what mental capabilities will best assist their progress. Altered habits of thought are then inherited (or transferred) from one learning environment to the next (i.e. LE_t to $LE_t + 1$) either via individual student behaviour or through their contribution to their group. Second, those aspects of the modified phenotypic expression (deemed to be favourable) and related to any changed habits of thought, are inherited by the groups from one learning environment to the next (i.e. LE_t to $LE_t + 1$). Third, and perhaps most importantly, the behaviours of the individuals and the groups has the potential to alter the nature of future interaction between the learning environment and all entities to be assessed. This is the central thesis of the niche construction concept; it provides a process through which students can alter their learning environment within their time and space and/or at least place pressure on the learning environment within their time and space.

Based on the author's observations, students can indeed be the continuous co-architects of ever-changing learning environments. In its simplest form, such changes have been determined through the changing perceptions of individuals that impact upon the process of peer assessment operating on and within group performances. As groups collectively alter their judgements as to what satisfies the stated learning objectives contained within the process of criterion-based assessment that alters the process of natural selection operating on both individuals and groups. Also, as students make profitable alterations to their habits of thought (and therefore their routines) they do so locked in an inquisitive battle to find better solutions to the problems present in their learning environment. Many of the solutions they devise place substantial pressure on the learning activities used. This creates the need to adjust learning activities to continually stretch the students' capabilities. As such, the students have the ability to inherit a modified learning environment due to their direct and indirect influence.

Discussion

So far, the discussion has not attempted to unite the concepts of the reasonable adventurer, self-development and niche construction. The process of synthesizing these concepts, binding them with the thoughts of those associated with educational excellence now forms the challenge of this paper. The aim is to demonstrate that without a well designed learner-centred approach; the aim of developing skills (be they for SMEs or otherwise) may well fall short of the mark. The ideas introduced represent the resurrection of much pedagogical brilliance that all too frequently is ignored due to the pursuit of *efficient* teaching practices in higher education.

From the outset, let it be stated that the potential evolution of any student's habits of thought is cast as a phylogenetic process, not just an ontogenetic process (i.e. based on a fixed set of instructions). This is because it is a process determined by much more than the mere inheritance of genetic ability. It is also determined by the interaction of the student with other students and the learning environment within which they congregate. Therefore it is also phylogenetic evolution (Hodgson, 1993), allowing for the total and ongoing evolution of a group of students. It has been proposed that generative mechanisms (i.e. habits of thought) determine structural change (the capacity for actual behaviour), and that these mechanisms may also be altered through a blind (and differential) process of selection.

That said, it is argued that the focus of the students' learning experience should be related "to the interaction between learner and the external conditions in the environment" to which they react (Tyler, 1949, p. 63). Tyler felt strongly that the learning process "takes place through the active behaviour of the student; it is what *he* [or she] does that he [or she] learns, not what the teacher does". This suggests the need to provide much freedom (Whitehead, 1929) to allow students to react to their environment – to allow their learning to occur in the here and now, in true Whiteheadian spirit. The dulling boredom of involvement with an imitation subject (Sawyer, 1943) can be removed through the provision of freedom to apply formal ideas to the problems that lay beyond the classroom, into the world of the (individual) student.

Exactly just how such interaction occurs between student and learning environment is an issue open to many possible explanations. The use of an evolutionary approach provides a useful way of considering this process whilst still remaining aware of identifying any specific causal factors. Many early psychologists, for example, Lloyd Morgan and John Dewey, have discussed such issues. For Morgan (1896), congenital impulses are adapted through the grafting of acquired dispositions through individual experience with altered environments – this being especially so during the period of youthful plasticity, when individual intelligence has the most influence upon the modification of habit. Essentially, an evolutionary process is at play with intelligent selection (or choice) determining which profitable experiences should be retained and which unprofitable experiences dispensed with. In a similar vein, Dewey (1922, p. 93), notes that it is not through the growth of customs (in terms of instincts) that development occurs. He suggests rather, that it is through the acquisition of new (and profitable) habits. Dewey states that it is through personal impulses that "the re-organization of activities turn, they are the agencies of deviation, for giving new directions to old habits and changing their quality". Clearly,

Whitehead's (1929) concept of educational freedom is essential throughout this process. Through the provision of freedom, student impulses may interact with the learning environment in such a manner as to assist in the development of independent action and new skills. In this sense, Dewey states that habits are not a native predisposition, but rather, they are organized activities that have been acquired through a secondary process.

The above discussion suggests that the needs of students desirous of skills development extend beyond traditional lecturer-student process, towards a learner-centred approach skewed towards experiential learning, self-exploration, freedom, and continual reflection. An approach where students can frequently interact with challenging learning activities assessed on the basis of the grades of intelligence demonstrated (Morgan, 1896). Too often students are required to perform isolated tasks (in the guise of skills development) that amount to little more than an opportunity for an internal stock take of existing skills, but contribute little to serious skills development. At best, any developed association of impulse and experience is likely to be consigned to memory only. Alternatively, under circumstances where the interaction between impulse and experience is reoccurring, congenital impulses have a greater opportunity for genuine conformation, or modification through which acquired impulsive tendencies are developed. That is, conscious selection is replaced by sub-conscious automation. Morgan attributes the sources of impulsive tendencies on one hand based to the inheritance of ability, but also due to the individual acquisition of ability.

The above discussion relates nicely to the work of both Heath (1964) and Baxter Magolda (2004). Skill development in the sense discussed by Morgan and Dewey is reliant on students using their individuality to extend their future abilities beyond their initial mental endowments. They are required to understand the environment within which their various impulses interact, to modify their habits so as to ensure progress. In this sense, they are following the path that Heath argues will lead them towards becoming a reasonable adventurer. Clearly this is not a passive educational process within which students are subdued. The self-development process will not proceed if students accept received knowledge as absolute, they must be capable of pressing forward to challenge their individual epistemological assumptions and find meaning in their knowing *vis-à-vis* the contextual situations they encounter. In this respect, the concept of niche construction provides a process through which to consider how skill development could occur within a learner-centred environment. Most importantly, it demonstrates a process through which students actively change the structure and meaning of their world. It does not represent a static challenge within which student outcomes are determined through a ranking process (i.e. norm-referenced assessment), but rather an endless staircase of possibility. A process that offers the opportunity to all students to continually test the fitness of their impulses, a process that makes possible the acquisition of valuable skills. Skills that relate directly to the NESF and therefore, skills that are in demand by SMEs. Finally, a process that accommodates the varying levels of learning skills and self-awareness of individual students (Weimer, 2002).

Alfred Whitehead's (1929) brilliant protest against dead knowledge also offers much wisdom that transfers directly to the development of skills. For Whitehead (1929,

p. 93), the aim of any business school is to produce students with a zest for business that have an ability to apply their acquired wisdom to all future tasks with intellectual imagination. Further, Whitehead maintained the role of the university is to preserve “the connection between knowledge and the zest of life”. It is the development of an urge within our students towards new creative adventure that should be the ultimate aim of education”. For Whitehead, the issue is how knowledge is used, and specifically the time and place within which it is contextualised. He states that:

The mind is never passive; it is a perpetual activity, delicate, receptive, responsive to stimulus. You cannot postpone its life until after you have sharpened it. Whatever interest attaches to your subject-matter must be *evoked* here and now; whatever powers you are strengthening in the pupil, must be *exercised* here and now; whatever possibilities of mental life your teaching should impart, must be *exhibited* here and now. That is the golden rule of education, and a very difficult one to follow (1929, p. 6, my emphasis).

Operationalizing the ideas of Whitehead leads to in a dynamic learning environment in which understanding is not only *evoked* in the students’ here and now, but also *exercised* and *exhibited* in their here and now. Through freedom, students are granted the responsibility to generalize how the development of their mental abilities and habits of thought provide fitness in their world. They are afforded the opportunity to re-organize their activities through the means of positive deviance (Sparks, 2001), thus potentially improving upon existing habits. They are given the opportunity to construct the niche within which their development is occurring; precisely the task required of them post graduation. This is a highly significant fact, that students are not working to perfect a specific task (i.e. appreciation of a specific strategy for a specific situation), but rather learning how to make sense of their personal abilities within an ever-changing learning environment (i.e. they are learning to strategize). The development of this skill set is argued to provide a far more important skill that is likely to be highly valued by Australian SMEs.

As illustrated in Figure 1, the process of niche construction occurs over several time periods. Within and across time periods, the specific (learning) traits selected for or against and in combination, place upward pressure on the selection pressures associated with assessment procedures. Returning to the specific skills highlighted by the NESF, it is not hard to imagine how students will be continually required to improve their communication skills to operate within their group, and to assist the group operate in a competitive learning environment. Much teamwork is required to coordinate their activities within and across workshops and semesters. Understanding how best to approach different tasks *vis-à-vis* the nature of different assessment procedures requires the ongoing engagement of problem solving skills. Students are not merely complying with the rules and regulations of a learning environment, they are also using their initiative, planning and organizing skills to shape the nature of their learning environment. In undertaking such tasks, those students that develop most do so through the use of self-discipline and the development of contextual knowledge. Finally, the endless freedom afforded the students encourages them to experiment and gain proficiency across a range of technologies. Throughout such a process, each student’s habits of thought are subject to change with the opportunity to lock in favourable new capabilities that increase their fitness across the various learning environments they encounter.

Conclusion

That graduates need to develop better skills to assist the competitiveness of Australian SMEs is not a proposition questioned within this paper. The focus has been on considering *how* skills may effectively be developed. The general argument made is that skills cannot be added on through requiring students to engage in isolated activities that are not specifically linked to other learning activities. Worse still, that the common practice of having students deliver the occasional presentation or work infrequently in a group is unlikely to aid the development of any useful skills. It has been claimed that without specific (and ever-present) assessment processes; the necessary selection pressures are absent, thereby preventing the possibility of an evolutionary process. Assessment therefore should be conducted in an authentic manner, designed to "test those capacities and habits we think are essential, and test them in context" (Wiggins, 1989, p. 41). As a result, assessment outcomes for students relate to the symbiotic relationship between their simultaneously developing knowledge and skills.

Viewing assessment as something other than a sorting mechanism that ranks students from best to worst introduces many new responsibilities to the educator. Both summative and formative feedback should be provided to the students from which they can reflect on their performance. "They must talk about what they are learning, write about it, relate it to past experiences, apply it to their daily lives" (Chickering and Gamson, 1987, p. 3). As previously stated, this process of generating both summative and formative assessment performs two important functions. First, the summative feedback provides an indication of the immediate fitness of the student and/or his or her group's performance vis-à-vis their fellow students at that particular moment in time. Second, the formative feedback provides feedback through which future change is possible. With the "difference between them is that at some point the judgement has to be final" (Biggs, 2003, p. 142).

This suggests the needs to ensure students have the support and guidance of the educator regardless of how many mistakes are encountered on their journeys. A useful way of supporting the process of niche construction is to gather regular informal and formal feedback. This process can serve as both an invitation and a means of legitimising both the role of students as change agents and any new habits of thought under consideration. A simple way to proceed is to ask students what aspects should be kept, added and removed from the learning environment to aid their learning. This process can provide very rich and insightful feedback that can guide modifications to the learning environment with greater surety.

Finally, the need to allow students to self-develop in a guided manner has been suggested to be the primary purpose of education. Adopting the position that the primary purpose of education is to bring about changes in the student behaviour (Tyler, 1949), we can move towards a more inclusive curriculum within which skills are not the poor cousin of knowledge. They are in fact elevated to the same status and receive equal focus with regards the development of desirable learning outcomes. To many traditional educators this may lessen the role of higher education, but as Whitehead so forcefully asserted, "the proper function of a university is the imaginative acquisition of knowledge . . . a university is imaginative or it is nothing-at least nothing useful" (1929, p. 96). The self-development needs of Baxter Magolda

(2004) and Heath (1964) require the presence of excitement, curiosity, self-confidence and reflective capacity. Skill development cannot be added on to a process designed to gift knowledge. Skills are a way of knowing, they are inseparable from knowledge and must be treated so.

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