Integrating Graduate Attributes with Student Self-Assessment

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ABSTRACT

Many design courses are now located in university faculties, often taught by current or ex-design practitioners. There are mandatory qualifications in educational theory and practice required for teachers in most school systems, but universities tend not to insist that staff have similar qualifications. In both contexts teaching and learning strategies are not necessarily informed by the latest educational theory and research.

As both a design student and novice practitioner I was mentored on a one-to-one basis. As a new university lecturer the inclination was to teach as I had been taught. Faced with increasing student numbers this strategy began to fail. In seeking more viable approaches I decided to leave design education for six months to undertake some serious study with educational researchers in the UTS Centre for Learning and Teaching.

It became clear that there were important understandings and research about how students learn. In subsequent visits to university design courses in the UK, US and Australia it was also clear that there was little of this educational theory filtering through to design lecturers responsible for curriculum and assessment.

This dichotomy sparked a research journey implementing educational research findings and concepts. Whilst applying these to my own design teaching the attempt to involve students in their development of 'qualities' or 'attributes' became a focal point for further research.

Software I designed to facilitate the integration of this approach was adopted by UTS School of Design and is the basis of a two year Carrick Priority Projects Grant involving Business Faculties from four Australian universities.

This paper highlights the importance of a focus on graduate attribute development and the difficulties of an integrative approach. It draws conclusions about involving students in self-assessment as part of a developmental progressive process building over time and across subject boundaries.

INTRODUCTION

How can the development of 'graduate attributes' be encouraged given the pressures involved and taking contemporary educational theory and research into account?

In establishing the approach taken to this question I have included some of my research into the contextual pressures acting upon higher education providers in the field of Design in Australia. This is followed by some personal experiences that highlight the difficulties for those academics who have not formally studied teaching and learning strategies or been exposed to the value of educational theory and research. Both general and employer graduate attribute perspectives are discussed followed by brief descriptions from a pilot study in a Design School and a Business Faculty. The integrative process used for these studies involved an online system called ReView that I designed in response to the needs of a difficult and highly change-resistant context. Student self-assessment is a recent addition and early evidence shows that students are taking a reflective and responsible approach to their involvement in assessment processes.
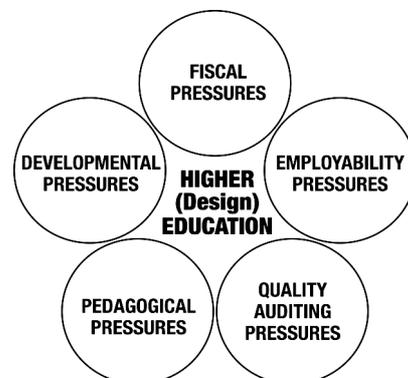
I. THE CONTEXT OF HIGHER (DESIGN) EDUCATION

Fig. 1. Pressures on the Higher Education design sector derived from an extensive literature survey (Thompson, 2004:10)

University design course applications continue to increase. The UK applications for university creative arts and design courses rose from 171,617 in 2000 to 223,281 in 2005 (UCAS, 2007). The statistics from Australian universities (DEST, 2007) combine 'arts, humanities and social sciences' as a category making definitive comparisons impossible. However, growth rates in actual enrolments have exceeded these percentages at UTS during the same period. Many of these students are full fee-paying with the rest accruing debt through the Higher Education Contribution Scheme (HECS) for every subject taken. No research is available on the affect of explicit costs-per-subject on students' attitudes to lecturers and tutors. It is probable that the result is further pressure increases in the educational environment. The other pressures mentioned in Figure 1 are exacerbated by continuing reductions in the Australian Governments funding of public education.

Academics in Australian universities are being pressured to increase both the quality and impact of their research outputs. In this context they are unlikely to respond to educational initiatives that add further work to their roles in teaching and assessment. This resistance is compounded when design and other 'professionally oriented' courses are taught by current or ex-design practitioners without an understanding of educational theory and research.

'For too long we relied in universities on teaching that was essentially an amateur affair. ... A professional approach to teaching should be seen in the same light as a professional approach to law, medicine or engineering.'(Ramsden, 2003 p11).

To contextualise this strong criticism from a well-respected educational researcher it may be useful for me to reflect on my own experience in moving from full-time professional designer to full-time professional design educator. As both a design student and novice practitioner I was mentored on a one-to-one basis by some wonderful designers in London. Although I had previously taken a postgraduate certificate in education the inclination as a new university lecturer was to teach as I had learnt. Faced with student groups of forty or fifty this approach was not viable. Moreover the dubious educational value of this 'master-apprentice model' was pointed out as early as 1986 *(Swann, 1986)*. However, without an understanding of and value for educational theory and research there were no guidelines upon which to base alternative strategies.

II. ENTERING THE WORLD OF EDUCATIONAL THEORY AND RESEARCH

In 2000 I left the Design, Architecture and Building Faculty and launched into a six-month secondment to the UTS Centre for Learning and Teaching. This was a life-changing experience in a number of ways. For example it was stunning to find that much of the important educational research done twenty years earlier had not filtered through as practical guidelines in design schools. These include: understandings about the factors that encourage students'

adoption of a deep or surface approach to their learning (Marton and Saljo, 1976); the importance of an 'ecology' of alignment between learning objectives, learning activities, assessment tasks and assessment criteria (Biggs, 1991); the importance of accommodating students' learning styles (Kolb, 1976), and also that the development of graduates' 'attributes' was vital to their sustainable employment and lifelong learning abilities (Richards, 1979).

This secondment also led to an ongoing research journey focusing on design education with particular emphasis on student self-assessment, self and peer assessment and the development of graduate attributes. The following sections explore different perspective views of graduate attributes followed by findings from pilot studies aimed at the integration of graduate attribute assessment.

III. GRADUATE ATTRIBUTES - FROM DIFFERENT PERSPECTIVES

There are many opinions about the range of attributes that design (and other) graduates need and few universities have made explicit the processes by which formal education develops them. The term attributes used here is intended to include a range of terms such as 'key skills' (Drew et al., 2002), 'generic attributes' (Wright, 1995), 'key competences' (Mayer, 1992) and 'transferable skills' (Assiter, 1995).

So which attributes should we attempt to develop?

Brewer's Dictionary of Phrase and Fable tells us that Shakespeare proposed 5 attributes (known as the 5 'wits'. They were: (1) Common sense; (2) imagination; (3) fantasy; (4) estimation; and (5) memory. Common sense is the outcome of the five senses; imagination is the "wit" of the mind; fantasy is imagination united with judgment; estimation estimates the absolute, such as time, space, locality, and so on; and memory is the "wit" of recalling past events. In latter years DeBono suggested that we all need to develop our thinking attributes and suggested approaching problems using six 'thinking' skills cleverly explored in his book 'Six Thinking Hats' (DeBono, 1999).

In order to survive in and contribute to a changing world and workplace students need to develop a broad range of qualities integrated with discipline knowledge and skills. Employer studies *(Garner and Duckworth, 2000)* indicate dissatisfaction with university graduates in a range of attributes that universities often claim in their graduate profile statements.

IV. ATTRIBUTE DEVELOPMENT - THE EMPLOYERS PERSPECTIVE

Graduate attributes constitute vital qualities, skills and knowledge for successful employment and lifelong learning. A study of design engineering graduates and their employers in the UK revealed a deep dissatisfaction with current graduate profiles. In Garner and Duckworth's study, the employers' criticisms included the following points:

- They need greater ability to take other people's ideas on board.
- They have a lack of resilience to criticism.

- They have a weak ability to muster a reasoned defense of their contribution.
- They need to improve listening skills.
- They need higher-quality written, graphic, and verbal communication.
- They need to be able to be critical of their own work and contributions.

(Garner & Duckworth, 2000, p. 208)

Garner and Duckworth's study also derived 5 'fields of competencies' from a combination of line managers and graduates perceptions of competencies required for employability.

Field 1 Communication and Relationship competencies
Field 2 Practical competencies
Field 3 Management competencies
Field 4 Innovation competencies
Field 5 Information Technology (IT) competencies
(Garner & Duckworth, 2000, p. 209)

Employers in many fields are becoming more vocal in their demands for improvement in graduates' attributes (Business Council of Australia, 2006) and indicate that these should be a core focus of university undergraduate and postgraduate courses. The Carrick Institute which funds Teaching and Learning development in Australia has identified the 'Integration and assessment of graduate attributes in curriculum design' as one of four 'common curriculum issues'. (Carrick Institute, 2007). This focus on the actual assessment of graduate attributes has met with a great deal of resistance in the academic context (Thompson, 2006).

V. ATTRIBUTE INERTIA - THE ACADEMIC PERSPECTIVE

Edicts from business, government and education hierarchy seem unable to stimulate the integration of graduate attribute assessment. There has now been a decade of educational rhetoric about the shift in higher education to the development of capabilities rather than the delivery of content (Leckey and McGuigan, 1997). There is also a great deal of evidence that 'assessment drives learning' or more subtly: 'The backwash effect of assessment on learning is widely acknowledged' (Haynes, 2004:159). Given the weight of evidence it would be reasonable to assume that every university subject would integrate the assessment of graduate attributes..

However, in a time-poor, student-heavy, overstressed and financially deprived education system what hope of introducing change? The table in Appendix I illustrates a typical step-by-step process where staff are asked to map their subjects' contributions to attribute development. Whilst many lecturers have 'ticked the boxes' to link their subjects to graduate attributes a recent survey of the staff in one faculty at UTS showed minimal penetration despite concerted efforts to simplify and promote the UTS Graduate Profile Framework.

Fig. 2. A recent survey showing that from 78 academic staff respondents (65 full time and 13 part time) 55% had heard of the UTS Graduate Profile Framework and only 32% had seen it.

Change will always meet the powerful inertia of habit and the status quo but the ongoing studies described in this paper are beginning to reveal how a process involving an online assessment system, may catalyse a deeper approach. Student self-assessment appears to be an important factor and it is interesting to note that educational research now affirms that student involvement in assessment and self-assessment is a powerful driver of learning and can substantially improve curricula *(Falkichov, 2006)*.

VI. THE 'REVIEW' PROCESS

The promise of reductions in the time it takes to mark assignments is a powerful incentive but the review of assessment criteria needed an easy to follow step-by-step process. Step 1 in the recent pilot studies reads as follows:

"**Step 1:** Pick one of the subjects you are coordinating and read over the assessment tasks and learning objectives in the Subject Outline with the following question in mind:
'What skills do I want the students to acquire, what knowledge do I want them to construct and what qualities do I want them to develop when engaging with this task?'
Make a few notes and have a look at the assessment criteria on page 2 and check whether any of these could be used in assessing the task." (extract from staff handout, 2006)

In this instance page 2 referred to a list of discipline-specific attributes in categories that had been agreed upon by the School or Faculty concerned.

The following categories were developed by the School of Design in response to the UTS Graduate Profile Framework:

- Creativity and Innovation
- Communication and Interpersonal Skills
- Attitudes and Values
- Practical and Professional Skills
- Critical Thinking and Research Skills

The two Business Faculties involved in pilot studies had different categories but the one used for data in this paper developed the following draft categories:

- Business Knowledge and Concepts
- Communication and Interpersonal Skills
- Critical Thinking and Analytical Skills
- Business Planning and Practical Skills
- Attitudes and Values

These categories are similar to the 'fields of competencies' from Garner and Duckworth and Shakespeare's '5 wits' mentioned earlier.

It is also interesting to note that in the forty subjects input so far there has not been one criterion written that could not be categorised under the attribute categories developed.

It must be emphasised at this point that no online system is a cure-all but may be a catalyst to engage staff in a 'review' of their assessment tasks and the integration of graduate attributes with other assessment criteria.

The ReView online system is gradually being implemented at the UTS School of Design amounting to 126 subjects and 1200 currently enrolled full-time undergraduate students. The following screenshots are from a pilot scheme in the UTS Bachelor of Accounting course conducted in 2006. ReView was used for the assessment of a first year Subject and externally by 30 major companies assessing Business student interns' performance against attribute criteria.

Figure 3 - A subject profile allows staff and students to view the subject's emphasis in the five attribute categories currently in development at UTS Faculty of Business. Pie charts can also display the attribute emphasis of individual tasks within the subject.

Figure 4 - Students view of a screen portion showing the tutor's feedback (grey vertical bars on the grading scales) and the student's own self-assessment (triangles above the grading scales). The student view does not show specific percentage numbers (that are visible in the lecturer/tutor view).

The introduction of student self-assessment as a formative approach to engaging the students in the assessment process began in March 2006. The grading scales (shown in Figure 4) allowed students to give themselves ratings against criteria prior to tutor assessment. This was only enabled in a few subjects and was not obligatory or assessed as part of students marks. Data was collected on the number of criteria assessed by tutors and how many were also rated by students.

In Table 1 it can be seen that in subjects with self-assessment enabled just over 30% of criteria that were marked by tutors were also self-assessed by students. In almost half the self-assessed criteria students had underrated their own performance compared to the tutors assessments.

No. of Criteria assessed by tutors:	No. of Criteria self-assessed by students:	No. underrated by students:
9,474	2,920	1,370
	No. of Criteria self-assessed at 98-100%:	
	53	

Table 1 - Students engaged in self assessment with less than 2% rating themselves at the very top of the grade scale. Almost half the criteria self-assessed (47%) were underrated compared to the tutor's assessment.

The data collected for Table 1 was a composite of first year and second year undergraduate design degree subjects in 2006 where student self-assessment had been enabled by the subject coordinator.

Whilst timesaving in assessment has been a strong motivation for staff wanting to use the online assessment system some comments indicate a much more erudite and student-centred approach:

'Having trialed the ReView online assessment system in my Business subject last semester, I see a tremendous potential for it as a means of improving the skills development of UTS Business graduates. Tying assessment directly to desired graduate attributes brings a great amount of clarity to the task of assessing student work. It could bring about significant and valuable change in the way student assessment in this Faculty is designed and executed.' *(UTS Business Faculty Staff member email 15.02.07)*

VII. CONCLUSION

The benefits of the online assessment system for graduate attribute integration have emerged through a number of pilot schemes and case studies (Thompson, 2004). In some cases the benefits were purely administrative whilst others were more educationally significant. The following is a brief summary:

• the subject coordinator of a large first year design subject found the online benchmarking and monitoring of a number of tutors saved her a significant amount of time and inconvenience;

• each assessment criterion was coded to an attribute category, and students found it useful to see their progress in particular aspects, (eg. Communication and Interpersonal skills), from a range of assessments across multiple subjects;

• in coding all the assessment criteria for each assessment task the automatically generated pie chart showed some subjects with an inappropriate emphasis considering the student year and intended learning outcomes;

• a third of students who were offered the (non-obligatory) opportunity to self-assess against criteria did so. Of those just under half the self-assessed criteria were rated lower than tutors' ratings; and

• where there was a large difference between the tutors' assessment and the students' own self-assessment some tutors found this useful in focusing their written comments.

These last two points may be educationaly significant. In consideration of the non-obigatory approach to the introduction of self-assessment the online system facilitated student engagment in an apparently responsible and reflective manner. Students who assess their own performance against criteria are already learning even without feedback from a tutor. Boud (2000) also argues that to be an effective lifelong learner involves being an effective lifelong self-assessor.

Perhaps the convenience of online assessment is proving to be useful in encouraging academic staff to 'ReView' the alignment of their learning activities and the attributes they are intended to develop.

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Typical process when academics are asked to add graduate attributes to existing subjects or courses.	Advantages found by staff in pilot studies using the ReView online system that appears to have acted as a catalyst for the integration of attributes in assessment criteria and the review of learning activities.
Step 1: University and Faculty agree on graduate attributes list and academics are usually asked to tick boxes linking the subjects they teach to the approved list.	The system produces a pie chart of attributes categorised from assessment criteria entered for each assessment in that entire subject. Hence, mapped attributes by degree or major are easily possible. Such a task is manually very time consuming.
Step 2: Academics are asked to add graduate attributes to their subject outline from the approved list, relating them to existing learning objectives. This is a step where misalignment can easily occur between learning objectives and assessment tasks, as the graduate attributes are often not included in the assessment criteria used.	• The ReView process works from the opposite direction - from assessment tasks and their criteria for assessment of learning objectives. The potential for omission of graduate attribute criteria across a subject or course is reduced. • Assessment criteria can be selected and edited from a database of graduate attribute categories. • For each assessment task, additional assessment criteria can be added, coding them by graduate attribute category, and thereby integrating them with graduate attribute criteria. • Academics can develop their own database of assessment criteria and share with other colleagues. This can not only save time for peers, particularly those new to the discipline, but it increases the shared understanding within the department. Together with a new common language for discussing such aspects of teaching, there is an increased likelihood that departments will deliver, as intended, both program and subject outcomes.
Step 3: Academics develop marking sheets for themselves and tutors and assess the components of the assessment task (hopefully against criteria). Marks are then either calculated on paper or entered into a spreadsheet for calculation and compiling. At this stage the designation of assessment criteria to the development of particular graduate attributes is easily lost as marks and grades are totalled. Academics with a developed awareness of graduate attributes (vis a vis content learning outcomes) may provide written comments that may mention particular attributes and their development.	• ReView automatically generates online (and paper-based marking sheets if required). • Click-and-drag 'data-sliders' automatically show marks for each criterion and calculate weighted totals for each task. Both granular judgments (through individual criteria) and holistic judgments are integrated since sliders can be used and then subsequently fine-tuned when a holistic academic judgment is made to the aggregate mark for the specific assessment. • Each criterion is colour coded to a graduate attribute category displayed for both tutors and students. This allows immediate and common visual cues to be communicated and constructed. Tutors can more easily be inducted into understanding the coordinator's aims/agenda for the subject and the role of the assessments in delivering them. • Students can also self-assess against the criteria with similar data-sliders and these self assessments can be viewed together with the tutor's marks. Where there is a significant gap between the student's assessments and the tutor's marks on each criterion there is an opportunity to use this as a basis for a comment in the comment box. It also allows students to develop the language for discussing graduate attributes. • An increased number of assessment criteria, capturing more subtle aspects of students' performances, can be employed as there is no additional time incurred in calculations. The necessity for writing the same comments to large numbers of students is thereby eliminated.
Step 4: Unit of Study or Subject Coordinators attempt to meet with subject tutors and benchmark assessments before publishing the marks and grades. By this stage the mention of attribute development on marking documentation is often missing as single marks and grades for the task are discussed. It is also very difficult to alter marks at this stage when the mark is composed of a number of criteria and components. The logistics of checking tutors' comments in large classes is also a problem in regard to slowing down the feedback process. Written feedback is often delivered directly to students without intervention.	• As ReView is web-based, subject coordinators can see tutors' marks and comments at the same moment they are being entered (24x7) and can intervene before marks are published. • Each criterion is colour coded to relate to a category of attribute development and a 'results profile' displays a bar chart for tutors of each student's progress in developing graduate attribute categories across the range of tasks and subjects entered. • When the 'Total' data-slider is moved, it moves the individual sliders against each criterion and recalculates the task weighted marks, making it easy to alter marks whilst keeping the tutor's assessment of each criterion.
Step 5: Marks and grades are published. At this stage written comments are the only media by which a student can receive feedback about their attribute development unless a separate subject on attributes has been 'bolted on' to the curriculum. This approach has been heavily criticised in higher educational literature.	• The students' view of their marks is activated only when the subject coordinator clicks the 'Publish Marks' button. • Students can view a pie chart of the attributes assessed in each task and subject as well as their own bar chart of progress against each graduate attribute category as reflected in their progress in the degree.