Darrall Thompson Graduate Attribute Assessment: Using online visual communication to engage staff and students (Full Paper)*

* University of Technology, Sydney, Australia

Short biography of author:

Darrall Thompson is originally from the UK but emigrated to Australia and became a full time academic at the University of Technology, Sydney in '93.
His main research area is pedagogy, graduate attribute development and the use of technology in education. He has had many grants and publications in these areas and been responsible for the design and implementation of holistic assessment processes facilitated by software that he has also designed.
Darrall is now Director of Teaching and Learning and Senior Lecturer in the School of Design at UTS and Conjoint Senior Lecturer at the University of Newcastle in the Faculty of Science and Information Technology.
More info: http://datasearch.uts.edu.au/dab/staff/details.cfm?StaffId=2127

Paper:

Graduate attribute assessment: Using online visual communication to engage staff and students

Darrall Thompson, University of Technology, Sydney (UTS)

Abstract

Graduate attribute development is an 'emergent pedagogy' struggling to emerge. In this paper the context of attribute integration in higher education is discussed followed by a broad approach to the notion of attributes from Shakespeare's 'five wits' to recent industry reports on employability.

Whilst mapping attributes against learning objectives is commonplace in documentation there appear to be few coherent approaches to attribute development in assessment criteria. Given that 'assessment drives learning', it is not surprising that Government and industry view universities' attribute statements as ambit claims.

This paper explores research from a large Australian Government grant that is using an online assessment system with visual interface (ReView) to engage business faculties with attribute-coded criteria for assessment. Preliminary findings of interest relate to students' awareness of graduate attributes and their engagement with self-assessment, the value of visual communication for feedback, the development of attributes across subject boundaries and the subtleties of writing explicit assessment criteria.

Keywords: graduate attribute assessment; online visual feedback; student self assessment; educational change; assurance of learning

Introduction

This paper addresses the conference theme of 'Emergent Pedagogies' and informs the question: Is there a way to engage staff and students in graduate attribute assessment? The term 'graduate attributes' is used broadly here and includes 'key competences' (Mayer, 1992), 'employability skills' (CBC, 1992), 'transferable skills' (Assiter, 1995), 'generic attributes' (Wright, 1995) and 'key skills' (Drew *et al*., 2002).

The indication that new graduates now face five or six career changes in their lifetime has caused some academics to take more account of the development of attributes as part of a shift from 'content delivery' to 'capacity building'. For example, In this rapidly changing employment context, abilities in critical thinking, interpersonal skills, creativity, professionalism, problem solving and ethical attitudes become central to a responsible curricular approach at all levels of education. The speed of change and availability of information also provides an advantage to versatile individuals with the ability to apply their attributes to a variety of contexts and content domains.

Many academic departments have already been through the exercise of including attributes in curricula, with 'boxes ticked' to map them against learning objectives. However, whilst universities claim these attributes in describing their graduates, the educational changes required to validate such statements are slow to emerge;

> *Despite the lengthy history of the rhetoric of such policy claims, universities' endeavours to describe generic attributes of graduates continue to lack a clear theoretical or conceptual base and are characterized by a plurality of view-points. Furthermore, despite extensive funding in some quarters,*

overall, efforts to foster the development of generic attributes appear to have met with limited success' (Barrie, 2004: 261).

Research indicates that mapping graduate attributes only to learning goals without integration in assessment criteria often results in "a representation of the teachers' perspective and expectations, and may not be aligned with what the students both experience and perceive in terms of their development of graduate attributes" (Bath *et al*. 2004: 325).

Unfortunately, the resounding message from educational research that 'assessment is the single most powerful influence on learning in formal courses' (Boud, 2001:67), appears to have led to an increase in exams and their allocated percentage in curricula.

A serious approach to attribute development implies a reduction in the use of exams for a number of reasons (Thompson, 2006). An exam is an athletic event where the assessment method 'drives' the use of past papers and standardised answers as training devices. The knowledge 'crammed' has minimal retention and percentage marks and grades reveal nothing about the ongoing development of any of the graduates' attributes.

The integration of attribute development across subject boundaries and throughout the stages of a student's course of study is an important goal for higher education institutions. However, given that assessment drives learning, the achievement of this goal clearly relies upon explicit and visible links between assessment criteria and attribute development.

Shakespeare's 'attributes', a broad approach

There are many opinions about the range of attributes that graduates need and few universities have made explicit the processes by which they are developed in a formal education context.

So which attributes should we attempt to assist students to develop? The approach underpinning this paper is that all formal educational activity is attribute related, including the construction of knowledge in the content areas of any particular discipline. In other words all criteria for assessment can be written and coded to the development of a range of attributes. For example whilst it is recognised that many exams are very poor vehicles for attribute development, they still develop attributes such as 'the ability to reproduce memorised information within a time constraint'.
Shakespeare mentions 'memory' in his description of human attributes called the 'five wits' but he probably didn't have in mind the memorising of past exam papers and reproduction of standard answers. His list of attributes:
(1) Common sense;
(2) Imagination;
(3) Fantasy;
(4) Estimation; and
(5) Memory.
Common sense was defined as the outcome of the five senses working in collaboration; imagination was the "wit" of the mind; fantasy was defined as imagination united with judgment; estimation was to do with estimates of the absolute, such as time, space, locality, and so on; and memory was the "wit" of recalling past events.

The current plethora of exams would perhaps indicate that we are doing well with 4) and 5) but have forgotten about his first three (Thompson, 2006).

Closer to our time Edward DeBono suggested that everyone needs to develop their thinking attributes and suggested approaching problems using six 'thinking' skills cleverly explored in his book '*Six Thinking Hats*' (DeBono, 1999).

The business world favours psychometric (personality) tests, often frowned upon in educational research contexts, but it is worth considering some of the more rigorous approaches. Particularly as the pressure on universities to produce employable graduates begins to include personal attributes. For example the modern equivalent of Shakespeare's 'five wits' could be the 'Big Five Inventory' (Gosling, *et al*., 2003). This is a well supported taxonomy in psychometric research and is also known as the 'Big Five Traits' (for brevity the keywords in brackets have been derived from a number of lists and descriptions available in different texts:
- Openness to Experience (Creative, Versatile, divergent, lateral)
- Agreeableness (Warmth, Empathy, Sensitive communicators)
- Conscientiousness (Principled, careful, good self-regulation / self discipline)
- Extraversion (Active outgoing practical)
- Emotional Stability (emotions do not impact behaviour - research based)

Graduate employability is a key performance indicator increasingly applied to universities' 'output' and the business world is becoming vocal in its criticism of graduates' attributes. A study of design engineering graduates and their employers in the UK (Garner, Duckworth, 2000) revealed a deep dissatisfaction with graduate profiles. The employers' criticisms included the following reflections about graduates:

- 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 defence 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, 2000:208)

More recently, the need for action in the business education context is reflected in a report by the Business Council of Australia (BCA, 2006: 25). The report suggests that universities should be teaching critical thinking and ethical approaches together with the practical skills needed for employment. Further, the report suggests that such development become a core focus for both university undergraduate and postgraduate courses, noting:

> *Companies were concerned that education and training systems were not providing people with appropriate skills in areas that were increasingly vital in creating the type of workplace culture in which innovation thrives. In particular, a number of companies noted that management education was focussed on finance and marketing but was not providing graduates with the 'soft' skills such as teamwork, that enabled innovative use of these capabilities.* (BCA, 2006: 25).

This and other reports (AIG 2006: viii) send a strong message to universities that a broad range of transferable attributes are vital for young graduates entering a rapidly changing world of work.

However, the inertia surrounding these contexts is also compounded by the requirement on most academics in Australia to increase their research output, rather than focus on anything to do with teaching.

Research Context and Methodology

Business Faculties building on a Design School strategy

A grant of $203,000 was awarded in 2007 to a project team that included the four Associate Deans Teaching and Learning from the only business faculties in Australia with accreditation from the American Association of Colleges and Schools of Business (AACSB). The author is also a Project Leader for this grant and Director of Teaching and Learning for the School of Design at the University of Technology, Sydney (UTS). The project involves online criteria-based assessment software (ReView) designed by the author and implemented in the School of Design as part of a graduate attribute integration strategy.

The success of the approach taken in a design school context was the basis for the intention to develop a Business oriented graduate attribute integration process using ReView. There is ongoing evaluation and regular communication with partner institutions, a reference group and an international group that includes academics from the UK and the AACSB accrediting body.

In reference to the work of Rust, O'Donovan and Price (2005), the project employs a social constructivist approach whereby the acquisition of knowledge about assessment processes, criteria and standards is achieved via active engagement and participation by both students and Business educators.

The context of each of the four institutions involved in this study is very different with regard to the integration of attribute development and prior educational initiatives.

In order to delimit the scope of this paper, the evidence presented here is based on:

- the analysis of student pre and post surveys across all four institutions
- an initial analysis of students' engagement with self assessment
- the early analysis of video interviews with academic coordinators and tutors involved with the project.

There is no attempt to describe the process by which faculties and departments or schools in the four institutions derived the categories of attributes used to code the assessment criteria for assignments or units of study.

Description of the ReView online system

ReView is a criteria-based assessment tool that assists staff in making explicit the assessment criteria aimed at the development of university selected 'attributes' across different subjects or units in a course of study. It also enables students to 'self-assess' their own work against those criteria and monitor their own development of the discipline-specific attribute categories. The following screen shot in Figure 1 shows a marking screen from a Faculty of Business subject after the student's self assessment and the marker's assessment against the criteria

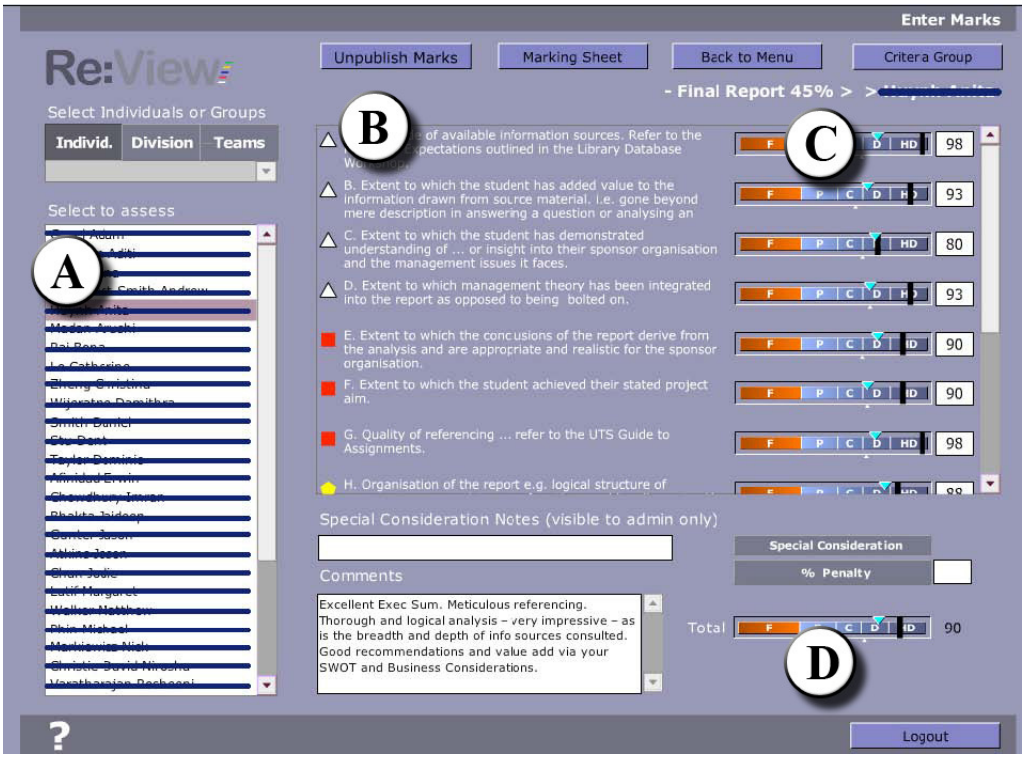

Figure 1 - Marker's view of the marking screen from a Faculty of Business subject.
A: *Selectable list of students (obscured here for ethics de-identification),* ***B:*** *Colour-coded symbols next to the criteria represent one of five attribute categories in this particular university example,* ***C:*** *Data 'sliders': The black line is the tutor's slider. The turquoise triangles on the top edge of the data slider are from the students' own self assessment (done prior to tutor marking and not visible until tutors have marked),* ***D:*** *'Total' data slider: the black bar can be dragged causing the marks and bars on other criteria to move in proportion for benchmarking purposes.*

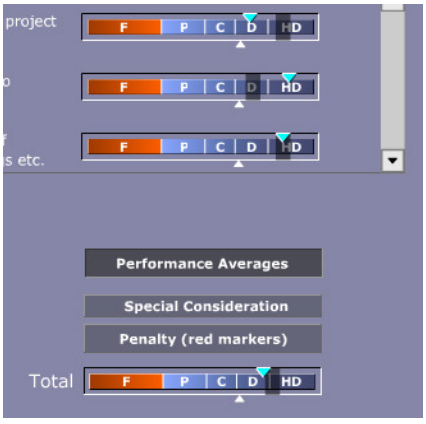

Figure 2 *- Students view of a screen portion showing the tutor's feedback (broad translucent grey vertical bars on the grading scales) and the student's own self-assessment (triangles above the grading scales). The student view does not display specific percentage numbers (however, these are visible in the lecturer/tutor view shown in Figure 1).*

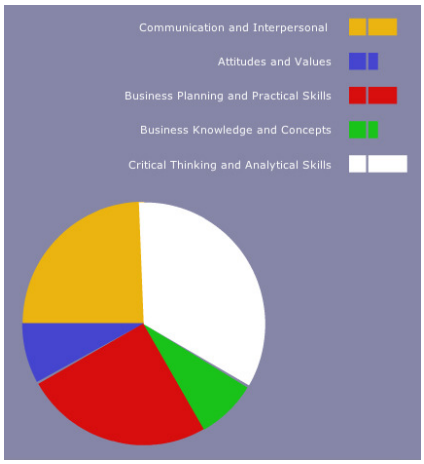

Figure 3 *- A subject profile allows staff and students to understand more clearly a subject or unit of study breakdown of the assessment criteria in relation to the five attribute categories in this particular Business Faculty example: Communication and Interpersonal skills, Attitudes and Values, Business Planning and Practical Skills, Business Knowledge and Concepts, Critical Thinking and Analytical Skills.*
Pie charts can also display the attribute emphasis of individual tasks within the subject.

Features of the ReView system:

• Assessment criteria can be selected and edited from a database of graduate attribute categories. For each assessment task, additional assessment criteria can be added, coded 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.
• 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 using the 'Total Slider' (see Figure 1 **D**).
• Each criterion is colour coded to a graduate attribute category displayed for both tutors and students.
• Students can self-assess against the criteria with similar data-sliders and these self-assessments can be viewed together with the tutor's grading.
• ReView is web-based, subject coordinators can see tutors' marks and comments when they are entered (24x7) and can intervene before feedback is published.
• 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.
• 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 journey through different levels of a degree programme.

Findings

The following brief extracts of findings come from early analysis of surveys and video interviews across all four institutions in subjects or units that are using the ReView online system.

Table 1: Online Survey Questionnaire:

Q2a Do you think that the opportunity to assess your own work in this subject is important? (Prior to ReView implementation)

		N	%
	Yes	**1,502**	**89.2%**
	No	182	10.8%
Total		1,684	100.0%

Students indicated by majority (47.8%) that the reason was to do with better understanding subject content, with 35.1% identifying the reason as self-improvement.

Table 2: Online Survey Questionnaire:

Q3a Have you heard of the term 'graduate attributes'? (Prior to ReView implementation)

		N	%
Graduate Attributes	Yes	333	23.5
	No	1,087	76.5
Total		1,420	100.0

Of the 23.5% who had heard of the term half indicated that they thought that the term related directly to employability.

Student comments from a survey having used ReView in one 1st year subject

Positive comments:

• "The software was useful in encouraging me to critically analyse the quality and standard of work I had submitted. My final score in self-assessment was very similar to the actual score I received".
• "I found it very useful to be aware of the specific attributes that graduates have to develop and the areas they have to be applied in.
• "Make it compulsory that all Tutors must use it!".
• "Makes clearer what is required for a good mark and what results in a poor mark".

Negative comments:

• "I saw I over-estimated the quality of my work. This was indicated to me visually. So what? How about a feedback comment for each of the criteria. A triangle here and a triangle there is not explicit feedback."

• "We need to be able to see what the graduate attributes mean rather than just knowing that we've completed something which is related to one or all of them"
• "This is the first time I have heard anyone use Graduate Attribute Development and seen the categories - and I have attended all the lectures and tutes for this subject".

Table 3: Paper-based survey analysis of three iterations of a single subject

Questions relating to assessment and online engagement (% of students that agree or strongly agree)	**2006** **Pre-ReView**	**2007** **ReView Pilot 1**	**2008** **ReView Pilot 2**
Q3. This unit of study helped me develop valuable graduate attributes (eg. research inquiry skills, communication skills, personal intellectual autonomy, ethical, social and professional understandings, information literacy etc.)	84.6%	81.8%	88.9%
Q8. Feedback on assessment assisted my learning in this unit of study	56.4%	73.8%	80%
Q10. Online learning (eg. with Blackboard) supported my learning in this unit of study	70.3%	79%	90.9%

In analysis of the data in Table 3 it should be noted that these data are provided by three different groups of students (stable at approximately 60 each year) so care needs to be exercised when making comparison between these scores. The subject is also not exactly the same in each year and there are broad ranges of factors that influence these data.
However, the figures show an increase across three iterations of an individual Unit of Study, using the three questions associated with assessment and graduate attributes. It should be noted that 80 - 90% ratings are considered high in these surveys. In a brief analysis of student comments from the USE survey, in 2007 there were 5 unsolicited positive comments about ReView and in 2008 there were 15. The negative comments went down from 6 to 4.

Student Self Assessment

The following data is drawn from early analyses about students' engagement with self-assessment using the ReView software in one particular Economics subject.

It was not obligatory for students to do self-assessment, which they could do prior to handing in their assignment up to the time that their tutors' marks were published. The following table gives an indication of the degree to which students underrated their performance against the stated criteria compared to the tutors' allocated percentage marks:

Table 4: Analysis of students underrating of their own assignments against criteria

Criteria assessed by tutors:	Criteria self-assessed by students:	Criteria underrated by students:
2,440	1,870 (76.6%)	632 (33.7%)

Number of students enrolled and completing a written assignment: N=244

In other data for Table 4, there were 24 (12.8%) students who self-assessed and gave themselves a High Distinction (a total mark between 85% and 100%). These figures imply that a majority of students are engaging with the criteria in a thoughtful manner. There is evidence now emerging that students who self assess on a second assignment are much closer to the tutor's grading against criteria than in their first assignment.

The following comments are early notations from the research staff conducting video interviews and focus groups. The videos have not yet been transcribed and analysed but the comments reveal some interesting issues.
Positive comments:
Quote: "It has been the most enjoyable marking experience I have had in 15 years of teaching."

• One of the best things about ReView is that it makes explicit that which was implicit in thinking about Learning Goals and writing criteria and aligning them with Graduate Attributes.
• Staff and their students, were more aware of graduate attributes as a result of their participation in this project, and would use ReView again.
• ReView provided detailed feedback that students read, independently of the process of collecting their marks.

Negative comments:

Quote: "How can students be expected to self-assess, when the teachers have different individual expectations for awarding HDs or Ds, C, etc."
• If ReView had spell-check, and a tool to weight the criteria separately/differently, and a larger comment box, it would be more likely to attract users.
• There are too many different online tools and students resented having to learn to use so many virtual bits and pieces (as do their teachers).
• ReView was not the 'silver bullet' they were hoping for.

Conclusions

Whilst the data is preliminary, there are some interesting issues raised. The origin of the project came from a successful approach to attribute development, using ReView in a School of Design, whereas this project is located in business faculties. A similar analysis of self assessment to the one published in this paper can be found in (Thompson, 2007), where design students underrated 46% of criteria. It is tempting to begin making comparisons between student cohorts in different faculties but the author's reflection on this project to date is that there are hugely complex and interacting causes and effects, impossible to interpret from tables and percentages.
For example, the data on student self-assessment reveals a vast differential that is just as likely to be influenced by the teacher's conceptions or a host of other factors. The student and staff comments relating to misunderstandings about the assessment process clearly point to a need for academics to include their tutors, and students, in a more thorough engagement, perhaps using the assessment criteria as a 'fulcrum of engagement'.

An issue impacting the project was that the implementation of graduate attribute teaching and assessment had previously met with responses ranging from reluctance to resistance. Focusing on the negative aspects evident so far, it seems that student reluctance is based in their central focus on percentage marks or skills for entry to employment. Teacher resistance responses are, in part, related to the premise that the content of a subject and its assessment should be based only on discipline specific content. The assessment of 'additional' attributes is seen to be a distraction or unnecessary extra work. Lack of awareness about a program's graduate attributes is also an issue. The 'grass roots' emergence of the ReView online system has in part happened because of a perceived timesaving aspect and the convenience of online marking for tutors, and coordinators of large subjects.

However, staff weariness with online systems is also evident from the video interviews and focus groups as a negative influence. This effect varies from institution to institution. For example at two of the universities involved in this study they each have two or three different logins and passwords for various university systems, and for security reasons these change every three months. It is vital that any new system conforms to the most ubiquitous authentication system, and if possible a 'single sign-on' system should be introduced.

In reviewing the comments to date, the process that the ReView software appears to catalyse is the making explicit that which is implicit through a more careful approach to the wording of assessment criteria and their colour-coding to attribute categories. It is important to note that software, as one of the participants quoted, is not a 'silver bullet' to solve all our problems. But whilst this could also be a paper-based process, the convenience associated with online marking and feedback seems to bring a fresh context that enables a new approach.

With regard to further phases of this project, there is no doubt that more work is needed. Weaning students off percentage marks to focus them on formative criteria-based feedback is no mean task but there are early signs that some business staff and students realise the value of this approach. The wording of criteria requires supporting concepts and the criteria stems database in ReView will be helpful in guiding staff toward appropriate language which matches the levels of learning and range of attributes that can be included.

In conclusion, the top-down assurance of learning related to Graduate Attributes needs to be met with a bottom-up explicit integration of it in assessment criteria. It would seem that a web-based system that facilitates this alignment through a clear visual interface carries enough benefits to outweigh the inertia that has plagued this particular emerging pedagogy.

References

AIG, (2006) *World class skills for world class industries: employers' perspectives on skilling Australia*, Australian Industry Group, Sydney.

Assiter, A. (1995) ed. *Using Transferable Skills in HE,* Kogan Page, London

Barrie, S. (2004) 'A research-based approach to generic graduate attributes policy', *Higher Education Research and Development*, 23 (3), 261 – 275

Bath, D.; Smith, C.; Stein, S.; Swann, R. (2004) 'Beyond mapping and embedding graduate attributes: bringing together quality assurance and action learning to create a validated and living curriculum', *Higher Education Research & Development*. 23 (3), 313-328

BCA, (2006) *Report: New Concepts in Innovation: The Keys to a Growing Australia*. Business Council of Australia PDF [online] <*http://www.bca.com.au/Content.aspx?ContentID=100408* > [7 February 2007]

Biggs, J. (2003) Aligning Teaching and Assessing to Course Objectives, *Proceedings Teaching and Learning in Higher Education: New Trends and Innovations*, 13-17 April Aveiro, Portugal

Boud, D., R. Cohen, *et al.,* eds (2001). *Peer Learning in Higher Education.* London, Kogan Page.

Business, Industry and Higher Education Collaboration Council. (2007). Graduate employability skills. Graduate Employability skills report.[online] <http://www.dest.gov.au/sectors/higher_education/programmes_funding/programme_categories/key_priorities/documents/graduate_employability_skills_pdf.htm> [17 October 2007]

Gosling, SD;Rentfrow; PJ. Swann WB. (2003) - "A very brief measure of the Big-Five personality domains" *Journal of Research in Personality*, Elsevier

Davies, P. (1999).' What is evidence-based education?' *British Journal of Educational Studies* 47(2), 108-121

DeBono, E. (1999) *Six Thinking Hats*, Back Bay Books. Little, Brown and Company New York

Drew, S.;Thorpe, L;Bannister, P. (2002) 'Key skills computerised assessments, Guiding principles', *Assessment and Evaluation in Higher Education* 27 (2) 175-186

Garner, S; Duckworth, A. (2000) 'The employability of design graduates: A study of competencies achieved through undergraduate design education' In SWANN, C. A. Y., E. ed. *Re-inventing Design Education in the University*. Perth, West Australia, Curtin University of Technology.

Mayer, K. (1992) (chair) *Key Competencies: Report to Ministers of VEET*, AEC Australia

Rust, C.; O'Donovan, B ; Price, M. (2005) 'A social constructivist assessment process model: how the research literature shows us this could be best practice', *Assessment and Evaluation in Higher Education*, 30(3), 233-241

Thompson, D.G. (2006) *E-Assessment: The Demise of Exams and the Rise of Generic Attribute Assessment for Improved Student Learning in Self, Peer and Group Assessment in E-Learning* ed. Roberts, T. Idea Group USA

Thompson, D.G. 2007, 'Integrating Graduate Attributes with Student Self Assessment', ConnectED: International Conference on Design Education, Sydney, Australia, July 2007 in *Proceedings of ConnectED 2007, International Conference on Design Education*, Zehner, R. ; Reidsema, C. eds, 2007, University of New South Wales, Sydney, Australia,1-6.

Wright, P. (1995*) What Are Graduates? Clarifying The Attributes of 'Graduateness'*. The Higher Education Quality Council (HEQC): Quality Enhancement Group