

## Using an Electronic Tool to Encourage Pedagogical Change

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***Abstract:** This paper discusses the development of an online database- driven electronic tool for building profiles for university courses (or subjects). We take the view that any technology, including a pedagogic one, needs to be designed for, understood as and evaluated within its place in a complex socio-technic system of human-to-human as well as human-to-tool relationships.*

*Many academics are reluctant to make changes to their practice either because of change fatigue or insufficient commitment to or understanding of the new requirements for transparency and accountability. In our institution, adoption of a new policy for the production of standardised course profiles gave us the opportunity to draw all of the school staff into the new processes. We designed an electronic tool which embodies both the course profile policy and the explicit identification of and planning for graduate attributes and which seeks to pay attention to the socio-technic system within which it operates. Intended as a tool to aid academics meet requirements, it has had the benefit of encouraging users to reconsider their understanding of such educational issues as objectives and criteria and reconsider their educational aims. This paper describes the design of the tool from both technological and social viewpoints.*

*This paper also addresses the relationship between the technical design of the tool, university policy and good pedagogical practice, the mapping of learning objectives to assessment and the mapping of graduate attributes to programs.*

***Keywords:** course profiles, pedagogic change, electronic tool*

### Introduction

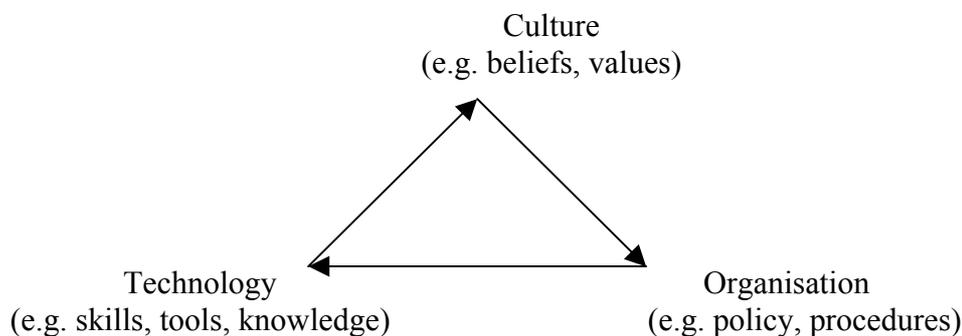
Until recently, the sub-title of the Catalyst Centre which we are both associated with mentioned “sociotechnical research”. It has been changed recently partly in response to the difficulty many people had in knowing what sociotechnical research might be. An understanding of the term is relevant here because it is a way of understanding the relationship between technology, users and organising systems that we believe is helpful in many aspects of research and practice in the technological disciplines, including teaching. Understanding these relationships not only makes our interventions more immediately effective, it allows us to see how we can get double value from our work as, in this instance,

both response to one demand and trigger for change in another direction. The development of the tool we describe below came about in response to University and IEAust demands to map graduate attributes, but has also helped us to encourage academics to consider some basic aspects of their practice and to begin to rationalise it in line with pedagogic theory.

## The Sociotechnical Approach

“skills and tools exist not merely in a relationship between people and the material world, but are components of activities carried out in respect of other people” (Carrithers 1992:65).

This quotation from the anthropologist Carrithers makes the point well. It is not just that relationships exist between technology and people, but that technology is constitutive of the relationships. One way of representing this is thus (where the arrows may go in either or both directions):



**Figure 1: Sociotechnical relationships**

Bodies such as IEAust see the mapping of graduate attributes as a technology that will help them influence the kind of education being offered to young engineers. However, it is our observation that the culture of engineering, with its emphasis on practicality and applied achievements, militates against academics’ adoption of this technology. The requirement to impart technical skills and knowledge is seen as far more important than paying attention to many of the “soft” attributes and certainly more important than mapping where they might be expected to be addressed in any particular course. When you add to this, conditions in universities that see academics suffering from change fatigue and general overwork, it is not surprising if the message about graduate attributes sometimes appears to fall on deaf ears. Under such conditions, we found that even when we ran workshops intended to help our colleagues work their way through the graduate attribute issue, they were poorly attended. There was no reason to think that any electronic tool for attribute mapping we might make available would be readily adopted.

The real opportunity came in the guise of a policy change across the University requiring a standard course profile format. Under the umbrella of this change we were able to present the Course Profile Builder tool as a shortcut to satisfying the new requirements, but we also built it in such a way that lecturers had to give sustained thought to the consistency of attributes, learning activities, assessment tasks and criteria. In this way we aim to change attitudes and practices in respect of the non-technical attributes most in need of attention.

## The Course Profile Builder

### Motivation

The immediate motivation for developing the system was to:

- Raise the standard of course profiles available to students
- Map graduate attributes across programs and for individuals
- Increase course coordinator's awareness of good pedagogical practice
- Provide data for ongoing research into engineering education and the use of technology in education
- Increase the level of collaboration amongst academic staff

In other words, we aimed to address all three aspects of the sociotechnic system we call engineering education.

### Structure

The structure and contents of the profile builder and course profiles is designed to satisfy both the university policy for course profiles and to conform with accepted pedagogical practices. The final structure was a hybrid between the University policy and the pedagogical model for developing course profiles discussed below.

### The Policy

The major areas of the course profile come directly from the University of Queensland's policy. The fourteen sections of the policy are outlined in table 1.

Section	Summary of Policy
1. Course Details	Course Title, Faculty or School in which the course is offered, Contact Hours (and locations if consistent across the semester), Brief Description of Course Content, Course Coordinator and Contact Details, Other contributors (if relevant)
2. Aims and Objectives (Objectives and Goals)	The policy calls this section Objectives and Goals, for clarity we renamed it Aims and Objectives. Where an aim is a broad vision for the course and the objectives are specific measurable learning objectives. The policy gives no detail on this section.
3. Graduate Attributes	The policy required coordinators to identify which generic and discipline-specific graduate attributes will be developed in the course and refer to the manner in which those attributes will be developed (e.g., the relationship of graduate attributes to the course content, teaching and learning processes and assessment methods). This should be done in the context of the university's set of graduate attributes detailed in table 3.
4. Assumed Background	No Details in the policy.
5. Teaching and Learning Methods	No Details in the policy.
6. Recommended Texts	No Details in the policy.
7. Resources Available and Required	No Details in the policy.

Section	Summary of Policy
8. Assessment Details	<p>This section of the policy is quite specific and also refers to another university policy on Assessment Practices. Some of the key requirements are:</p> <ul style="list-style-type: none"> <li>• an explanation of how the assessment method/s proposed will give expression to the objectives or goals of the course;</li> <li>• a clear identification of the number and type of each item of work to be submitted;</li> <li>• the assessment method(s) proposed for each item and the date each item is to be submitted;</li> <li>• a guide to the relative importance of every item of work to be submitted;</li> <li>• the assessment criteria by which a student's level of achievement will be judged</li> <li>• other aspects of the course that students must complete before they are eligible for a passing grade (eg. lecture and seminar attendance, field work, etc.);</li> <li>• how the various results are to be combined to yield grades;</li> <li>• faculty or school policies for managing incidents of nonconformity with assessment requirements, including the conditions of and penalties for late submissions, granting of extensions, possibility of re-submission, violation of assessment specifications (eg. number of words), plagiarism, and class participation (where it contributes to assessment);</li> </ul>
9. Plagiarism	This section allows for standard clauses for first years and group work.
10. Support for Students with a Disability	Standard clause for provision of assistance to students with a disability.
11. Employment Screening	Standard clause for students working with children.
12. Use of Dictionaries in Exams	Coordinators must declare whether the use of dictionaries is permitted in the exam.
13. Feedback	The policy deals with the availability of timely feedback on all progressive assessment; broad feedback on end-of-semester examinations and a student's responsibility to incorporate feedback into their learning.
14. Contact Schedule	A list, by week, of lectures/practical classes and content coverage in each contact session. (with an alert to the students that this schedule might be subject to change)

**Table 1: Summary of the University of Queensland Course Profile Policy**

It is evident from Table 1 that the University policy on course profiles is open to much interpretation in most of the sections. In order to give the profile more structure and alignment with standard pedagogical practice it was further broken down into subsections. These subsections are drawn from the iterative pedagogical model discussed below.

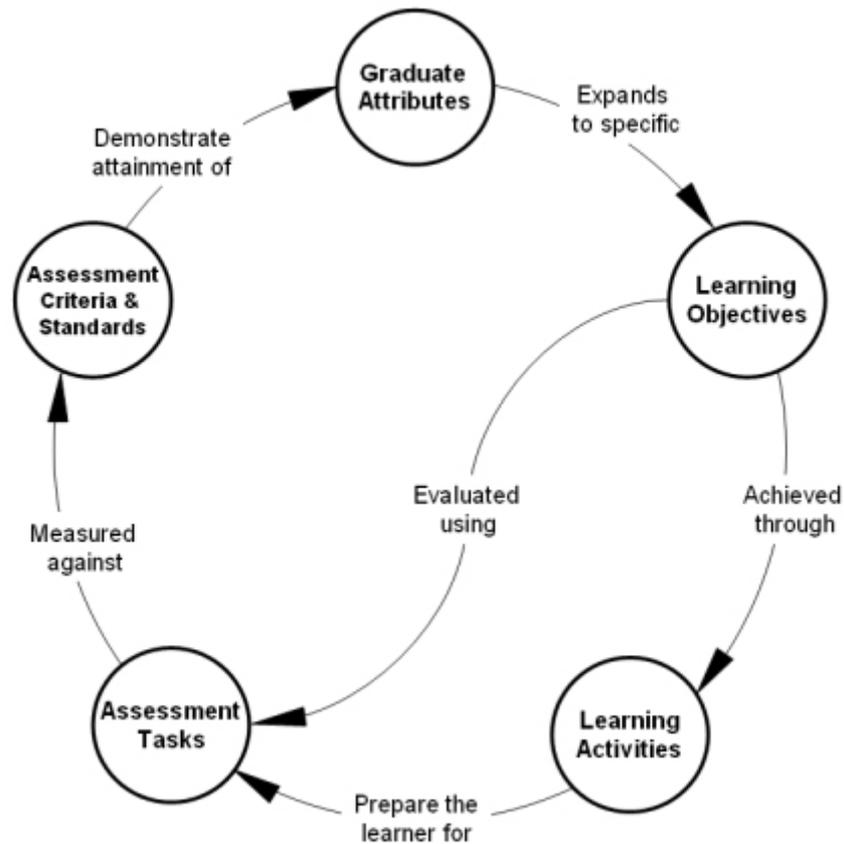
### The Pedagogical Model

Figure 2 is a graphical model showing the relationships between graduate attributes, learning objectives, learning activities and assessment tasks, criteria and standards.

The model infers that you can start developing a course from any of the five nodes in the loop and continue to move iteratively through the process until you have the desired result. The model is generalized and does neglect some of the interconnectivity between the nodes.

Starting with the list of *graduate attributes*, as the University has already predefined these, it is possible to expand the applicable graduate attributes for a course to a set of specific

*learning objectives*. In turn, these objectives can be achieved by designing a series of student focused *learning activities*. These activities prepare the learner for a series of *assessment tasks* which can be measured against a set of *assessment criteria and standards*. These assessment criteria can be used to show that a student has developed particular aspects of the desired *graduate attributes* in a course. The summation of the *assessment criteria* over a program should show that all of the *graduate attributes* have been acquired and assessed. Such a method is a useful tool for demonstrating the necessary outputs for accreditation of programs.



**Figure 2: Iterative Pedagogical Model**

It is evident that this process has a high level of interconnectivity and would be difficult to turn directly into a “one size fits all” database driven tool. Therefore it was desirable to minimize the “technical” dependencies between the sections of the profile to those that would enhance the process. For example when entering details for an assessment item coordinators are presented with a “check box” list containing the learning objectives they have already entered, making it easy for them to map objectives to assessment as shown in the model. Such an approach therefore assumes they have refined the learning objectives before entering the assessment details. This could be overcome by forcing coordinators to follow a step by step process, however this would counteract the inherently iterative process of developing a course profile. To maximize the systems flexibility the course profile builder allows users to move freely between sections placing the responsibility of managing the interconnectivity in the profile with the user.

In terms of the sociotechnic model, this means that lecturers come to the task of using the tool as a result of organizational pressures. For many, its use is straightforward and merely embodies their existing practice in a form that meets University requirements and allows for

easy editing as changes occur. For those whose cultural values and practices are challenged by making course objectives, graduate attributes and the logic of assessment explicit, the tool lets them know what is required structurally and provides some examples on help pages. We also ran training workshops at which staff had the opportunity to discuss the logic and use of the tool and these events often turned into pedagogical discussions. In this way, we see the tool as impacting on the culture of at least some of the users, and hence potentially supporting long-term change.

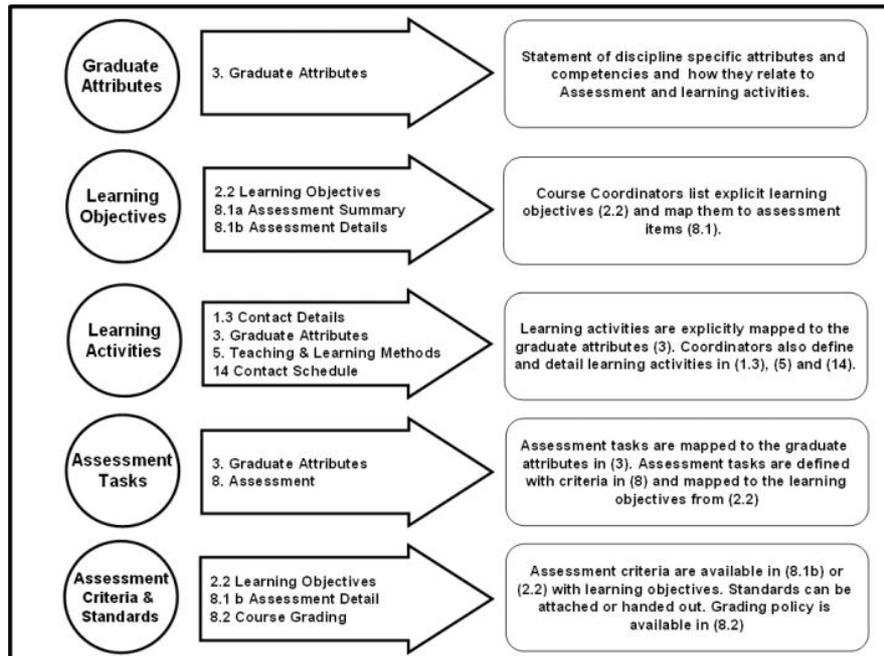
### The Policy and the Pedagogy

While the structure of the University policy is founded in accepted pedagogical practice it gives little guidance to a course coordinator on the appropriate content. The course profile builder introduces subsections and processes to explicitly link the pedagogical model and the policy. Table 2 contains a description of the profile subsections and figure 3 illustrates how they relate to the model. Greyed shaded sections in table 2 indicate sections with strong links to the pedagogical model.

<b>1 Course Details</b>	
1.1 Summary	Handbook details, Coordinators and staff, website.
1.2 Introduction	Brief introduction to course.
1.3 Contact	Type of contact, location and time.
1.4 Laboratory Safety	Refers to University policy.
<b>2 Aims and Objectives</b>	
2.1 Course Aims	Broad vision for the course
2.2 Learning Objectives	Specific and measurable objectives that can be mapped to assessment. Option to add criteria.
2.3 Course Content	Brief descriptions of topic areas covers.
<b>3 Graduate Attributes</b>	
Maps specific competencies, learning activities and/or assessment against the University's graduate attributes.	
<b>4 Assumed Background</b>	
Statement of assumed background knowledge required for undertaking the course.	
<b>5 Teaching &amp; Learning Methods</b>	
Definitions of teaching and learning methods specific to the course.	
<b>6 Recommended Texts</b>	
6.1 Recommended Texts	Lists recommended texts drawn from central database linked to UQ Library with ability to annotate for each course.
6.2 References	As above for references texts.
<b>7 Resources Available and Required</b>	
7.1 Resources Required & Other Resources Available	Statement of resources required, including materials and additional costs, and extra resources available to students.
7.2 Online Resources	List of online resources with live links.
7.3 Course Materials	List of course materials such as notes, cover sheets etc with live links.
<b>8 Assessment</b>	
8.1a Assessment Summary	Tabular summary of course assessment including due dates, learning objectives and weightings.
8.1b Assessment Details	Details above plus assessment description and links to other relevant materials. List of criteria and information on availability of standards
8.2 Course Grading	Requirements for grades 1-7 plus any additional grading condition.
8.3 Late Submission	Course policy on late submission.
<b>9 Plagiarism</b>	
Standard statement on plagiarism.	
<b>10 Support for Students with a Disability</b>	
Standard statement on support available to students with a disability.	
<b>11 Employment Screening</b>	
Inserts standard statement if students in the course are working with children or young people.	
<b>12 Dictionaries at Exams</b>	

Course policy on the availability of dictionaries to students in exams.	
<b>13 Feedback</b>	
13.1 Course Feedback	Standard statement on the responsibility of students to integrate progressive feedback into their studies.
13.2 Curriculum, Assessment and Teaching & Learning Feedback	Process for giving feedback on the course, including link to the anonymous feedback system and the University grievance policy.
<b>14 Contact Schedule</b>	
Indicative week by week schedule for course contact including lectures, tutorials, practicals and individual study etc.	

**Table 2: Course Profile Builder Subsections**



**Figure 3: Mapping the pedagogy to the profile.**

### **Benefits of Using a Database**

Some of the benefits in using a database include:

- Central location of data and access point for students
- Easy to maintain records over time
- Ease of administration and quality control
- Increased collaboration
- The ability for students to access complete reading lists, assessment schedules and contact schedules for all the courses they are taking.
- The ability for the school to check student workload across the semester.
- The ability to map graduate attributes across the school, program and even for individual students.

### **Mapping Graduate Attributes**

In the graduate attributes section course coordinators are asked to state what specific competencies are developed, how they are developed (learning activities) and/or how they are assessed for each applicable University attribute. This makes it possible to then correlate the attributes developed in individual courses with program course lists and produce a map showing which courses develop which attributes across each program.

This concept can be extended further to individual students. Correlating a student's enrolment with the graduate attributes database it is possible to create a personalised mapping detailing where the student has developed each attribute.

**Table 3: The University of Queensland's Graduate Attributes**

Graduate Attribute	Sub Attribute
<b>In-Depth Knowledge Of The Field Of Study</b>	<ul style="list-style-type: none"> <li>• A comprehensive and well-founded knowledge of the field of study.</li> <li>• An understanding of how other disciplines relate to the field of study.</li> <li>• An international perspective on the field of study.</li> </ul>
<b>Effective Communication</b>	<ul style="list-style-type: none"> <li>• The ability to collect, analyse and organise information and ideas and to convey those ideas clearly and fluently, in both written and spoken forms.</li> <li>• The ability to interact effectively with others in order to work towards a common outcome.</li> <li>• The ability to select and use the appropriate level, style and means of communication.</li> <li>• The ability to engage effectively and appropriately with information and communication technologies.</li> </ul>
<b>Independence And Creativity</b>	<ul style="list-style-type: none"> <li>• The ability to work and learn independently.</li> <li>• The ability to generate ideas and adapt innovatively to changing environments.</li> <li>• The ability to identify problems, create solutions, innovate and improve current practices.</li> </ul>
<b>Critical Judgement</b>	<ul style="list-style-type: none"> <li>• The ability to define and analyse problems</li> <li>• The ability to apply critical reasoning to issues through independent thought and informed judgement</li> <li>• The ability to evaluate opinions, make decisions and to reflect critically on the justifications for decisions.</li> </ul>
<b>Ethical And Social Understanding</b>	<ul style="list-style-type: none"> <li>• An understanding of social and civic responsibility</li> <li>• An appreciation of the philosophical and social contexts of a discipline</li> <li>• A knowledge and respect of ethics and ethical standards in relation to a major area of study</li> <li>• A knowledge of other cultures and times and an appreciation of cultural diversity.</li> </ul>

### Future Improvements

Preliminary feedback from users has indicated two key areas for technical improvements. The ability to upload files to the system to be included throughout the profile and the ability to format text within a database field, i.e. paragraph breaks, bullets and hyperlinks. Both these issues have been resolved for version two.

In addition to technical improvements a set of resources is being developed and collated containing examples of course profiles and information on good pedagogical practices, including how to integrate project centred learning into courses. That so many members of the teaching staff are now taking an active part in discussion of such issues marks a significant cultural change. It is worth remembering that the notoriously difficult task of bringing about cultural change can often be more easily undertaken through the indirect connections embodied in the sociotechnic model.

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