ABSTRACT

This paper discusses a systematic approach for assessing some of the skills which students develop while undertaking and reflecting on internships. The approach provides a simple yet effective way to develop relevant assessment tasks, so that the assessment itself plays a constructive role in the learning process. It also provides a practical method for developing assessment criteria that are (a) consistent with the objectives of a program, and (b) suitable for inclusion as part of an e-Learning tool. The approach has been piloted with a beta version of the “ReView” e-Learning tool which is currently being developed at UTS. The e-Learning tool helps to achieve three main goals. First, the tool helps the course-developer to connect assessment criteria with the desired graduate attributes. Second, it is used in a way that encourages students to consider their reports’ strengths and weakness. Third, it provides a convenient means for markers to mark the students’ reports and provide timely and constructive feedback to the students.

Keywords
criterion-based assessment, e-Learning, graduate attributes

1) INTRODUCTION

This paper discusses an approach for assessing some of the generic skills (e.g. critical thinking skills) which students develop while undertaking and reflecting on internships. The approach attempts to take into account considerations of how various learning outcomes can be encouraged and enabled in students of internship programs. The approach is intended to foster beneficial reflection in the context of professional practice, drawing from ideas of Boud (2001; 2006) and Moulton (2007; 2008).

When attempting to develop skills in judgment and decision-making, teachers and learners can tend to employ oversimplified decision-making scenarios. Internships, however, typically place students in real-life situations of greater complexity. While classroom-based activities generally address comparatively narrowly defined exercises or exam questions, students in the workplace are typically required to exercise judgment in a much broader sense.

The generic skills that internships enable might be characterised as relatively difficult to assess. Traditional assessment and examination methods may work well in the context of classroom-based higher education, but it is possible that such methods are less successful in the context of professional practice. It is comparatively straightforward to grade students according to readily-assessable technical skills and readily-assessable chunks of knowledge. Assessing generic capabilities such as professionalism and reflective practice is a different matter entirely.

The majority of University of Technology Sydney Bachelor of Engineering students
undertake two 6-month internships as a part of a 5-year course. For example, a full time UTS engineering student typically progresses as follows: 18 months of classes; 6-month internship; 18 months of classes; 6-month internship; 12 months of classes/thesis. This case study specifically relates to the period between the two internships during which students undertake the subject *Engineering Practice Review 1*. The subject attempts to encourage thoughtful reflective practice and enable students to identify and document workplace learning.\(^1\)

2) **METHOD**

The approach for developing assessment criteria suitable for inclusion in an e-Learning tool is briefly summarised in the following five steps:

1. Consider the educational philosophy, and arrange principles as a set of questions.
2. Consider the intended graduate attributes.
3. Construct list of Example Indicators.
4. From this list, choose a balanced range of indicators and adapt to produce a small number (less than 12) of “assessment criteria”.
5. Review each indicator taking into account considerations of the educational principles and intended graduate attributes.

These steps are illustrated in the following sections

2.1) **The educational philosophy and principles were arranged as a set of questions**

UTS’s educational philosophy is set out in the *Coursework Assessment Policy and Procedures Manual*, (UTS, 2007) – amongst other things, it states:

> Assessment in UTS is based on the general principle of criterion-based assessment that means students’ work is assessed against stated criteria that reflect the objectives of the subject. Grades are based on a student’s level of performance in achieving stated objectives (criterion-referenced assessment), not on the number of other students who achieve a particular grade.

Two of the principles stated in the assessment policy are:

- a) Assessment should be an aid to successful learning and encourage students to apply their knowledge and skills in an analytical and critical manner.
- b) Students should receive feedback on their work in a timely manner that assists them to understand the learning objectives achieved and how they can improve the quality.

In the case-study described here, examples of questions that arose during this stage of the process are:

- How can the assessment criteria be formed to reflect the objectives of the subject? (What are the objectives of the subject?)
- How can the assessment be done in a way that assists learning, and at a level that is appropriate to the stage in the course?
- How can professional judgment skills be encouraged?
- How can feedback be given so that students’ understanding is improved?

2.2) **The intended graduate attributes were considered**

The National Generic Competency Standards put forward by Engineers Australia stipulates that graduates of engineering courses should have

- a knowledge base;
- engineering ability;
- professional attributes.

(Engineers Australia, 2005)\(^2\)

The University, on the other hand, specifies that graduates of the university should have a “graduate profile framework” with the following three broad attribute domains:

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\(^1\) Approximately 300 students per year complete their first six-month work-placement internship, and submit a report which is assessed using the criteria and e-Learning system described in the following pages.

\(^2\) These criteria are very similar to those of the Accreditation Board for Engineering and Technology in the USA (ABET, 2002).
- personal (e.g. managing own work)
- professional (e.g disciplinary knowledge)
- intellectual (e.g. critical and independent thinking)

After considering these and other principles, including those of Bowden et al (2000), and Ramsden (1992), five categories were arrived at.

The five categories are provided in Table 1.

Table 1: Categories of Intended Graduate Attributes

<table>
<thead>
<tr>
<th>Category</th>
<th>Example indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical thinking, analysis, modelling and research</td>
<td>Locates and reviews relevant information</td>
</tr>
<tr>
<td></td>
<td>Understands and applies logic and mathematics</td>
</tr>
<tr>
<td></td>
<td>Analyses and synthesises data and information</td>
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<tr>
<td></td>
<td>Handles complexity (e.g. does not oversimplify)</td>
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<tr>
<td></td>
<td>Demonstrates creative and flexible processes and solutions</td>
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<tr>
<td>Communication and cross disciplinary skills</td>
<td>Communicates effectively with others (written/oral)</td>
</tr>
<tr>
<td></td>
<td>Writes according to the reader’s level of technical expertise</td>
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<tr>
<td></td>
<td>Integrates engineering with other disciplines</td>
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<tr>
<td></td>
<td>Considers diverse interpretations and implications</td>
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<tr>
<td></td>
<td>Engages in multidisciplinary and inter-cultural activities</td>
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<td></td>
<td>Writes and maintains appropriate documentation</td>
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<tr>
<td>Attitudes and values</td>
<td>Recognises and values cultural diversity</td>
</tr>
<tr>
<td></td>
<td>Seeks input from internal and external sources</td>
</tr>
<tr>
<td></td>
<td>Considers community, environmental, political, economic and cultural issues</td>
</tr>
<tr>
<td></td>
<td>Reflects on long-term issues associated with engineering activities</td>
</tr>
<tr>
<td></td>
<td>Considers own and others’ rights and responsibilities</td>
</tr>
<tr>
<td>Planning and design</td>
<td>Documents and analyses requirements and specifications</td>
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<tr>
<td></td>
<td>Develops and analyses viable design concepts</td>
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<tr>
<td></td>
<td>Employs appropriate methods when planning and designing</td>
</tr>
<tr>
<td></td>
<td>Reviews solutions in light of specifications and requirements</td>
</tr>
<tr>
<td></td>
<td>Considers and manages constraints, hazards, risks and sustainability</td>
</tr>
<tr>
<td></td>
<td>Considers standards/design specifications when writing functional specifications</td>
</tr>
<tr>
<td>Specialist professional skills</td>
<td>Identifies and proposes options to achieve engineering solutions</td>
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<tr>
<td></td>
<td>Plans and manages the development of solutions</td>
</tr>
<tr>
<td></td>
<td>Proposes appropriate methods for testing, measuring and evaluating solutions</td>
</tr>
<tr>
<td></td>
<td>Solves problems by applying specialist engineering methods</td>
</tr>
<tr>
<td></td>
<td>Demonstrates understanding of engineering methods</td>
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</tbody>
</table>

2.3) A list of Example Indicators was created

Taking the competency criteria into consideration, example indicators for each of the above five categories were formulated. An attempt was made to express each indicator in simple language and as a distinct and universally comprehensible skill, ability, attribute or descriptor. The Example Indicators are provided in Table 2.

2.4) A balanced range of indicators was selected and adapted to produce assessment criteria

Several example indicators were selected from each category and adapted to become assessment criteria. The final set of assessment criteria was balanced in a way that emphasised...
Category 1 (critical thinking) and Category 3 (attitudes and values). This is because a major aim of the internship report writing task is to facilitate improved decision-making capacity and attributes relating to professional attitudes and values, while bearing in mind methods intended to foster beneficial reflection in the context of professional practice.

The attempt to stimulate lifelong development of judgment and decision-making capabilities was informed by work such as that of Boud & Falchikov, (2005; 2007), and Moulton (2008) – a key feature is that decision-making judgment is enabled by way of real-word experience and examples. In addition, learning activities which require students to make judgments about their own learning may be beneficial in developing lifelong learning.

3) HOW THE RESULTING CRITERIA ARE USED IN AN E-LEARNING TOOL

The assessment criteria were loaded into an e-Learning tool named ReView that is being developed at UTS. The tool is designed in a way that makes it particularly suitable for the development of criterion-based assessment tasks.

Students are able to access this tool from the pre-existing Blackboard learning environment, which is shown in Figure 1.

Figure 1: Screenshot showing the Blackboard and ReView e-Learning tools

The resulting assessment task and criteria are shown in Figure 2.

When the students submit their reports, they also login to ReView to provide a self-assessment of their reports strengths and
4) FINAL OBSERVATIONS

One of the challenges is enabling learning that connects to the diversity of student workplace experiences. Students not only have different disciplinary majors, but have been engaged in a wide range workplace cultures. When students return from their internships to the university, it seems that they experience a transition period. Given their wide range of disciplinary majors and workplace cultures, it also seems that the characteristics of each student’s transition can vary greatly from one student to another. Some of the challenges appear to be similar to those faced by programs that seek to enhance the first year experience (FYE), particularly the challenges associated with the transition (from various settings such as school, TAFE, work or unemployment) to the first year of university.

The criteria were cast in a way that addresses both the broad aims of the program and the specific aims of the subject. The assessment task is thus intended to assist students to identify, reflect upon and document what has been learnt, to develop a portfolio to meet professional affiliation requirements, to extend 'non-individual' technical expertise, to reflect on social and ethical responsibility, to consider personal, organisational, and societal attitudes and values, to identify areas that the student wants to focus on during future internships, to form a plan to achieve further learning, and to develop strategies for collaborative and life-long learning.

An important aspect of the criterion-based assessment approach described here is that it allowed the assessment to play a role in contributing to the learning process. It is constructively aligned, meaning that the assessment plays a constructive role in the learning process (Biggs and Tang, 2007). However, as noted by Boud and Falchikov (2005), when designing assessments for constructive alignment, it is useful to consider that assessment should not only be aligned to immediate learning outcomes, but also with what is expected for long-term, “longer lasting” learning.

In conclusion, the e-Learning tools provide a convenient means for markers to mark the students reports and provide timely and constructive feedback to the students. The real benefits, however, are achieved through efforts directed at developing well-aligned assessment criteria. Such efforts go a long way to ensuring that an assessment is effective in enabling the skills and attributes associated with long lasting and ongoing learning.

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REFERENCES


UTS Coursework Assessment Policy and Procedures Manual