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Setting Academic Standards for Tertiary Education in the Construction Industry

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ABSTRACT

The Australian Government recently established a new national regulatory and quality agency for higher education, the Tertiary Education Quality and Standards Agency (TEQSA). TEQSA will register providers, carry out evaluations of standards and performance, protect and assure the quality of international education and streamline current regulatory arrangements. As a precursor to TEQSA, the Australian Teaching and Learning Council has been commissioned to work with clusters of discipline communities to begin to specify how threshold learning outcomes particular to each discipline might be used as a basis for academic standards. This paper details the work of the Building and Construction discipline. A draft set of six TLOs have been developed to benchmark the graduate outcomes from Bachelor-level study in building and construction management in Australia. The draft TLOs have broad consensus agreement across the building and construction discipline and are evidence-based. It remains for the TLOs to be made more specific through further notes and examples, and for the representation of industry, students and recent graduates in the process to be improved.

KEYWORDS

academic standards, threshold learning outcomes, professional accreditation, building and construction.

INTRODUCTION AND BACKGROUND

“The new [Tertiary Education Quality and Standards Agency] will be at the centre of a new standards-based quality assurance framework. The framework will establish minimum standards that higher education providers are required to meet in order to be registered and accredited, as well as academic standards... Key to the success of the new quality assurance arrangements—and meaningful academic standards in particular—will be the active involvement of the academic community. It will be critical to strike the right balance to avoid generalisation or over prescription... Discipline communities will ‘own’ and take responsibility for implementing academic standards (working with professional bodies and other
stakeholders where appropriate) within the academic traditions of collegiality, peer review, pre-eminence of disciplines and, importantly, academic autonomy.”
(Australian Government, 2009:32)

The Australian Government is in the process of establishing a new national regulatory and quality agency for higher education, the Tertiary Education Quality and Standards Agency (TEQSA). TEQSA will have responsibility for the registration of all higher education providers, undertake the evaluation of the standards and performance of all such providers, protect and assure the quality of international education undertaken by the higher education sector and will seek to improve and streamline all current regulatory arrangements in Australia’s Higher Education system. As a precursor to the establishment of TEQSA, and in particular response to Recommendation 23 from the Bradley Review of Higher Education (Bradley, 2008:137), in 2010 the Australian Teaching and Learning Council (ALTC) was commissioned by the Australian Government to undertake a demonstration program to work with those communities of academic, professional, scholarly and business groups who constitute the broad range of discipline stakeholders represented in the higher education sector. The principal objectives of this Learning and Teaching Academic Standards (LTAS) project are to:

(i) engage clusters of discipline communities in the standards-setting agenda
(ii) define the appropriate level of detail and specificity for threshold learning outcomes on a discipline-by-discipline basis
(iii) achieve national agreement on a set of threshold learning outcomes for each discipline
(iv) articulate the framework of relationships between threshold learning outcomes and existing accreditation standards.

A total of nine broad discipline clusters have been identified, defined according to Australian definitions of Field of Education from the Australian Standard Classification of Education. Each broad cluster was supported by a designated Discipline Scholar. The discipline clusters are:

- Architecture, Building and Design
- Business, Management and Economics
- Arts, Social Sciences and Humanities
- Health, Medicine and Veterinary Science
- Science
- Education
- Creative and Performing Arts
- Engineering and ICT
- Law

For the Architecture, Building and Design cluster, the Discipline Scholar role has been split equally between Architecture and Building, with funding from July 2010 until July 2011. The key deliverable is a document that defines the nature and extent of the relevant discipline, establishes a set of Threshold Learning Outcomes (TLOs) as determined by
that discipline community, provides evidence of the development process and the extent of the support for and endorsement of the findings, and relates the TLOs to other relevant professional and international benchmark statements.

Central to all of this is the possibly vague notion of a discipline. In the current context, a discipline largely equates to a particular field of study and is measured operationally in terms of its particular subject matter, the skills and knowledge it requires, the methods and techniques it applies, and in the broad sense of a particular vocational destination. Even in that context, the notion of a discipline remains relatively amorphous. One of the critical tasks for each Discipline Scholar has been to constitute the nature and extent of their discipline. For the Building Discipline this involved establishing a Building Discipline Reference Group, comprising senior representation from various key stakeholder groups. There are currently 19 members of the Building Discipline Reference Group, representing the Australian Deans of Built Environment and Design, a range of relevant professional bodies, a mix of industry/employers, final year students and recent graduates, and academics from across the sector. The group has an independent Chair and the Discipline Scholar is an observer only.

**RESEARCH METHODOLOGY AND PURPOSE**

The critical task of the LTAS project is to define a set of Threshold Learning Outcomes (TLOs) based on community consensus. There was reasonable latitude for each Discipline Scholar to negotiate with the discipline over precisely which level of award and for which specific discipline community the TLOs would apply. In early discussions with key stakeholders it was agreed that the focus for Building would be the Bachelor-level award (Australian Qualification Framework, Level 7). However, there was no specific discipline group identified beyond Construction Management. The definition of the scope and extent of the Construction Management discipline is still being discussed, but is generally taken to exclude Building Surveying, Facilities Management, Land Economics and similar related fields. Whether or not Quantity Surveying will be identified separately remains one of the issues still under discussion.

A TLO can be defined as a clear statement of the set of knowledge, skills and the application of the knowledge and skills a person has acquired and is able to demonstrate as a result of a particular program of study in a given discipline, at the point of graduation (Australian Qualifications Framework Council, 2010:82). In other words, the TLOs are clear statements of what every Bachelor of Construction Management, or equivalent, graduate in Australia is expected to know, understand and be able to do as a result of their undergraduate program of study.
A broadly consultative approach has been adopted, fashioned to involve the key representative stakeholders as far as is practicable given the obvious constraints of time and other logistics, such as distance and availability. The consultation process began with a series of meetings with relevant professional accrediting bodies and academic peak groups, where the LTAS project was introduced, the project objectives discussed and community engagement encouraged. This was followed by a series of workshops convened with distinct key stakeholder groups to discuss the LTAS project objectives and identify an initial set of draft TLOs. The workshops were conducted as focus groups in order to provide the opportunity for stakeholders to communicate their perspectives with specific and detailed responses (Bender & Ewbank, 1994; Wilkinson, 2007).

A total of 14 half-day workshops have been completed, including eight specific to the academic staff of Construction Management programs, three specific to industry practitioners and employers, two specific to current students and recent graduates, and one a mix of academic staff and students. The workshops have involved a total of 108 participants, at locations across Australian Capital Territory, New South Wales, Queensland, South Australia, Victoria and Western Australia. The findings from the workshops have been analysed using both quantitative and qualitative methods so as to gather rich and detailed data that can also be triangulated.

The structure of the workshops was intended to elicit from the participants what they regarded to be the key TLOs from their particular perspective, and then to arrive at some level of consensus as to what the national TLOs for the discipline might comprise (Wilkinson, 2007). Each workshop commenced with a short presentation about the background and broad aims of the LTAS project. Participants were then invited to volunteer their key learning outcome proposals, and asked a series of open-ended questions to refine further the statements that were generated from this process. Following this discussion, a prepared set of 64 candidate TLO statements printed on individual cards were randomly distributed to pairs of participants. Each pair was asked to select only their five most preferred expressions of TLOs from the cards allocated to them, using a pyramid form of discussion (Jordan, 1990). These selections were recorded and then discussed specifically to identify any of the candidate TLO statements that had particularly captured one of the key learning outcomes previously mentioned, identified a critical TLO not previously mentioned, or had prompted consideration of a learning outcome not included in the discussion or in the candidate set.

The 64 candidate TLOs were compiled from a number of sources in order to provide as broad a spectrum of potential learning outcomes for the discipline as possible. The candidate set was never intended to be a comprehensive set of all potential learning outcomes, but rather to represent the typical range of statements that might be considered
and prompt discussion. The sources selected were representative of relevant professional accreditation requirements, the TLOs already identified in other related disciplines and the required graduate attributes typical of academic providers. Relevant professional accreditation requirements were summarised and drawn from the Royal Institution of Chartered Surveyors (16 in total) and Australian Institute of Building (15 in total). The draft TLOs for Engineering (14 in total) and Business (5 in total) were reworded into the context of construction management. The graduate attributes identified by Queensland University of Technology were included as a typical example of the more generic, institutional outcomes often required by the providers of Construction Management undergraduate education (14 in total).

Records were kept of the top five preferences for each pair of participants, and this data was recorded into a spreadsheet. The spreadsheet listed each candidate learning outcome by source, and for each workshop the top selections were separately identified for each pair. The records for each workshop were also distinguished so that the selections made by academics, industry and students could be analysed separately. In addition, both the pre-selection and post-selection discussions at each workshop were recorded with permission of the participants, and later transcribed for analysis using the thematic analysis functionality of Concordance software (Smith & Osborn, 2007; Wilkinson, 2007; Watt, 2011).

Working through the thematic analysis and a direct cluster analysis of the candidate TLO statements, several broad classification categories (or themes) were identified; some were expected themes while others were emergent (Bender & Ewbank, 1994:71). An example of an expected theme is that of communication, and one of the emergent themes was that of industry/work experience. Each of the candidate TLO statements were then allocated by the Discipline Scholar to a single one of the five potential categories identified. Despite the potential for subjectivity in such an approach, this was in practice a very straightforward process.

The spreadsheet analysis then comprised a simple tallying of the number of times each candidate TLO statement was selected at a workshop, grouped by stakeholder type (academic, industry or student) and again by classification category. Based primarily on the spreadsheet analysis, but informed by the thematic analysis, an initial draft TLO statement was proposed by the Discipline Scholar under each classification category. These classification categories and draft TLO statements were then distributed to the 150 registered parties with an interest in the project at that time. An anonymous online survey was made available where registered parties were invited to evaluate and comment on the categories and statements. The survey comprised eight questions. Question 1 sought an indication their primary interest in the building discipline.
(academic, industry, student or other). Question 2 used a five-point Likert scale, from strongly disagree to strongly agree, that the proposed categories best represent the range of critical learning outcomes for a building graduate. Questions 3-7 used a five-point Likert scale, from strongly disagree to strongly agree, that the draft TLO statement best describes the requirements for the relevant category. Questions 2-7 also invited any comments specific to that selection. Question 8 invited participants to register any other comments or broad concerns they had with the draft TLOs or the academic standards project more generally.

Based on an analysis of the survey responses the categories and statements were reviewed by a small panel of experts and a revised draft set of TLOs are now available for further consideration and comment.

RESULTS AND ANALYSIS

The broad classification categories (or themes) resulting from the thematic analysis and a direct cluster analysis of the candidate TLO statements were as follows:

- Cognitive Skills
- Coherent Knowledge
- Effective Communication
- Process Management
- Self-Development

From the spreadsheet analysis of the candidate TLO statement selections, the following results were determined:

1. The top three candidate TLO selections overall (maximum count 14) were:
   - integrate theoretical and technical building knowledge which includes a selection of construction technology, management, economics and law (source: Accountancy; count: 11; category: Coherent Knowledge)
   - apply problem solving and decision making methodologies to develop components, systems and/or processes to meet specified requirements (source: Engineering; count: 9; category: Cognitive Skills)
   - capacity to manage the planning, procurement and coordination of construction work (source: AIB; count: 9; category: Coherent Knowledge)

2. The top three candidate TLO selections by academics (maximum count 9) were:
   - integrate theoretical and technical building knowledge which includes a selection of construction technology, management, economics and law (source: Accountancy; count: 8; category: Coherent Knowledge)
• apply problem solving and decision making methodologies to develop components, systems and/or processes to meet specified requirements (source: Engineering; count: 6; category: Cognitive Skills)
• capacity to measure, cost plan, estimate and evaluate the construction and property economics over a building life cycle (source: AIB; count: 6; category: Coherent Knowledge)

3. The top three candidate TLO selections by industry (maximum count 3) were:
• an understanding of construction practices and principles (source: AIB; count: 3; category: Coherent Knowledge)
• the ability to identify, define and solve problems relevant to building (source: QUT; count: 3; category: Cognitive Skills)
• an understanding of construction law, codes, standards and contract administration (source: AIB; count: 3; category: Coherent Knowledge)

4. The top three candidate TLO selections by students and recent graduates (maximum count 3) were:
• capacity to manage the planning, procurement and coordination of construction work (source: AIB; count: 3; category: Coherent Knowledge)
• function as an effective member or leader of diverse teams, including those with multi-disciplinary and multi-cultural dimensions (source: Engineering; count: 2; category: Self-Development)
• communicate proficiently in listening, speaking, reading and writing English for professional practice (source: Engineering; count: 2; category: Effective Communication)

5. The candidate TLO selections by category overall (expressed as a percentage of the overall vote) were:
• Coherent Knowledge (27.4%)
• Self-Development (23.0%)
• Process Management (19.1%)
• Cognitive Skills (17.8%)
• Effective Communication (12.6%)

Based primarily on the spreadsheet analysis, but informed by the thematic analysis, the initial draft TLO statements under each classification category were then composed as follows:
• Coherent Knowledge
  integrate and evaluate theoretical and technical building knowledge which includes construction science and technology, management, economics and law
• Cognitive Skills

*apply creative and analytical problem-solving and decision-making methodologies to develop components, systems and/or processes to meet specified building performance requirements*

• Self-Development

*reflect on and develop personal performance and capabilities in terms of ethics, learning, accountability and teamwork in the context of professional practice*

• Effective Communication

*source, justify and communicate reasoned advice and ideas in multidisciplinary and multicultural situations involving both builders and non-builders and using technical, formal and informal communication instruments*

• Process Management

*judge and implement effective methods and strategies for the procurement, planning, control and financial management of construction work*

• Industry Experience

* demonstrate a level of engagement with the industry during the term of study that provides for an integrated understanding of both the theory and practice of building*

The addition of the Industry Experience category and TLO statement came after a review of the workshop transcripts. The issue of work experience was a significant topic of discussion, although it was never presented as a potential learning outcome by participants and is not explicit in any of the candidate TLO sources. There is no doubt however that it provides an underlying theme: “Experience is critical, work experience is critical” (TLO Workshop, University F). Its inclusion in the initial draft TLOs will be canvassed for more specific comment on the utility and viability of this as a TLO. Its inclusion is anticipated to be contentious.

Feedback and commentary from the online survey of project contacts regarding the initial draft TLOs has been encouraging. A total of 46 responses (with 1 spoilt) from the 150 registered parties represents a response rate exceeding 30%. The respondents were broadly representative of the overall composition of the registered parties, with 62% being academics, 31% industry and 7% students. Based on an analysis of the survey responses the categories and statements were reviewed by a small panel of experts using the following guidelines provided by the Tuning Project. According to Tuning (2010:44) for learning outcomes to be most effective they need to be:

- *Specific* (giving sufficient detail, written in clear language)
- *Objective* (formulated in a neutral way, avoiding opinions and ambiguities)
- *Achievable* (feasible in the given timeframe and with the resources available)
• Useful (they should be perceived as relevant for higher education studies and civil society)
• Relevant (should contribute to the aim of the qualification involved)
• Standard-setting (indicate the standard to be achieved)

The key changes made to the initial draft TLOs are as follows:
• The category themes have been simplified and made more distinctive.
• Innovation has been introduced explicitly in place of the more general Process Management category.
• Industrial Experience has been replaced with Work Integrated Learning. This implies a richer variety of ways to experience the building industry, other than just work experience, including the use of industry-sourced projects in assessments, industry guest lectures, case studies and other forms of engagement.
• Wording of each TLO has been changed to make the level of expectation more explicit. For example, knowledge is specifically fundamental, problems are specifically routine, collaborative situations are specifically straightforward.
• Safety has been added explicitly as a part of Self-Development.

The second draft TLOs are therefore as follows:
• Communication
  source, justify and communicate reasoned building advice and ideas in straightforward collaborative situations involving builders and non-builders
• Innovation
  research and evaluate emerging methods and strategies for the procurement, planning, control and/or financial management of contemporary construction work
• Judgement
  exercise judgement, employing appropriate problem-solving and decision-making methodologies to solve routine building problems under supervision
• Knowledge
  integrate and evaluate theoretical and technical building knowledge which includes fundamental aspects of construction technology, management, economics and law
• Self-Development
  critically reflect on personal performance and capabilities in terms of ethics, safety, teamwork and learning in the context of routine building problems
• Work Integrated Learning
  demonstrate a level of engagement with the industry during the term of study that promotes an integrated understanding of both the theory and practice of building
DISCUSSION OF RESEARCH METHODOLOGY AND RESULTS

The aim of this paper is to explain and describe the research methodology employed to develop the current draft TLOs, and present some of the evidence derived from and used to inform that process. The methodology has utilized a combination of workshops and questionnaires to determine both quantitative and qualitative data from a representative sample of key stakeholders in the building discipline. As with any such research methodology, there are a number of limitations and qualifications to the work:

(i)  *Is the sample of key stakeholders truly representative?*

It is certainly the case that whilst the broad key stakeholder groups are a sufficient representation of the discipline, individual groups are not equally represented. As one might expect, the participation of academics in this process has been strong and almost comprehensive. Professional bodies are also well represented. More direct industry representation is very limited, given the huge potential population of employers from which we might draw, and is bias towards the larger, top-tier construction companies. For the next round of workshops and invitations to comment on the draft TLOs it is intended that the number of industry representatives be increased quite substantially. This will require direct marketing of the project to industry through professional bodies and broader engagement with peak groups such as the Master Builders Association. Student and recent graduate representation is also very limited. Again, for the next round of workshops and invitations to comment on the draft TLOs it is intended that the number of student and recent graduates be increased significantly. An initiative to constitute a national student network for building and construction to support this process has not been successful. Instead, Heads of Schools will be asked to circulate information about the project and encourage greater student involvement.

(ii)  *Are the TLOs sufficiently specific and meaningful?*

There are few surprises in the current draft TLOs in terms of their scope and content. The proposal to include Work Integrated Learning may be contentious, but given the extent of the existing professional accreditation regulation the draft TLOs were always going to be relatively predictable. What did not exist previously was the evidence to support such a choice of TLOs. That said, the TLOs remain, of necessity, rather broad in their definition. This is probably inevitable for a national agenda taking a light-touch approach. It does, however, leave a significant scope for different interpretations of the same TLO statements and that is always going to be of concern for a regulatory framework. This will be addressed to some extent by the provision further explanatory notes for each TLO.
statement, and it is hoped such notes will include examples of the type of evidence/assessment outcomes that might demonstrate achievement of each TLO.

(iii) **How objective was the process of identifying and collating the draft TLOs?**

There is potential for anchoring and bias in any process of group work where opinions are being sought. The selection and composition of the candidate TLOs, for example, might represent some bias towards particular professional accreditation requirements and/or particular graduate attributes. This may well be the case, but to include a comprehensive set of all possible candidate learning outcome statements would have been overwhelming. The structuring of the workshops to seek unprompted participant suggestions before the use of prompt-cards helped guard against anchoring to some extent. The open-ended discussion after the card selection process and later invitation to revise and comment on draft TLOs also sought to mitigate the potential for anchoring to bias the results. Wherever possible the analysis has been driven by a mechanical process of numerical clustering which is explicit and repeatable. The most critical point in the process in terms of subjectivity was in the allocation of candidate learning outcome statements to the themes that had identified. This process will now be repeated using independent classifiers to ensure the robustness of that stage of the process. The actual/final wording of the TLOs remains open to continuing comment and feedback, but no further changes will be made without a general consensus of the full participant group.

(iv) **What use will the TLOs be put to and how will they be reviewed?**

The outcome of the Learning and Teaching Academic Standards project is a report that will go to inform TEQSA. It is not clear at this stage what regulatory approach TEQSA will adopt, but there is every indication that academic standards will be benchmarked in some way and that learning outcomes are highly regarded as a means to that end. Of course the TLOs in any such approach would need to be reviewed and modified to reflect changes in circumstance and fine-tune the intentions of key stakeholders. This process of review will be risk-based and proportional, rather than time-based.

(v) **What lessons are there for other discipline groups in developing such TLOs?**

The main lesson would seem to be that the process of grassroots consultation with all key stakeholder groups is an effective way to reach consensus on TLOs. The particular methodology used here provides a robust set of outcomes, supported with evidence. There is concern at this stage at the relatively low representation from key stakeholder groups such as employers, students and recent graduates. A broader representation of these groups from the start would have been useful. Finally, the potential for different interpretations of any TLO statement needs to be addressed as early as possible through
the use of explanatory notes and examples of the kinds of evidence and actual assessment outcomes are deemed to be acceptable.

CONCLUSIONS
The paper details the purpose and research methodology used to determine a draft set of TLOs to benchmark the graduate outcomes from Bachelor-level study in building and construction management in Australia. A draft set of six TLOs have been derived and presented. The draft TLOs have broad consensus agreement across the building and construction discipline and are evidence-based. It remains for the TLOs to be made more specific through further notes and examples, and for the representation of industry, students and recent graduates in the process to be improved.

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