cogent
education

*Corresponding author: Andrys Onsman, Melbourne Centre for Studies of Higher Education, University of Melbourne, Melbourne, Australia
E-mail: andrys.onsman@unimelb.edu.au

CURRICULUM & TEACHING STUDIES | RESEARCH ARTICLE

Constructively aligning the curriculum of a "New Generation" Bachelor of Environments degree from a social realism perspective

Andrys Onsman[1]*

Abstract: This paper describes the process of constructively aligning a generalist undergraduate degree using a sociological structure of professional education. Drawing largely on the work of educational sociologists like Young, Winch and Muller, the process aimed to introduce the notion of recontextualization as the curriculum driver for the constructive realignment of the wide range of disciplines that collectively make up the Bachelor of Environments, one of the University of Melbourne's "New Generation" degrees. Two factors were found to be crucial to the effectiveness and efficiency of the process. First, a practical framework for the task, agreed to by all participants, is essential to anchor the process. Second, participants must be willing to contribute openly and collaboratively to both the redevelopment and subsequent delivery of the proposed new curriculum.

Subjects: Architecture; Building and Construction; Education; Landscape; Planning; Property

Keywords: curriculum alignment; generalist degrees; educational sociology; social realist strategies

ABOUT THE AUTHOR

Andrys Onsman is a Learning and Teaching advisor in the Melbourne Centre for Studies of Higher Education, attached to Faculty of Architecture Building and Planning. He holds PhDs in Educational Psychology and Representational Media. He has a long record of investigating how twenty-first century skills are learnt, taught and assessed in higher education As disciplinary knowledge is increasingly accessible without filtration, critical and creative thinking skills, communication skills, investigation skills, project management skills have become core skills for all university degrees. How do we optimize increasingly more diverse cohorts' acquiring those skills? In research that crosses disciplinary boundaries, Dr. Onsman calls on recent advances in a range of disciplines, including Cognitive Science, Pedagogy, Management and Sociology amongst others, to identify, analyse and promote best practice in evidence-based professional education.

Andrys Onsman

PUBLIC INTEREST STATEMENT

This paper examines the development and maintenance of the curriculum of a multidisciplinary generalist undergraduate degree. The Bachelor of Environments is a generalist degree that serves as the gateway to both professional and postgraduate qualifications in Architecture, Urban Planning, Landscape Architecture, Construction and Property. Through a Bernsteinian framework, it examines how both objectives can be accommodated in a common curriculum, taught by staff from a wide array of disciplines with, at times, conflicting paradigms of practice and conceptions of pedagogy. The paper argues that the use of curriculum mapping as a fundamental phase of constructively aligning intended learning outcomes with graduate attributes is a key aspect of the international higher education sector. It demonstrates that an accurate curriculum map affords the ability to articulate in detail how the institutional and degree stated outcomes have been demonstrated by students during the course of his or her learning.

cogent·oa

1. Introduction

The benefits of constructively aligning the learning objectives, the teaching and learning activities and the assessment tasks in a formally structured programme of progressive learning have been clearly articulated and substantiated as productive and beneficial (Biggs, 1996, 2003; Jervis & Jervis, 2005; Wang, Su, Cheung, Wong, & Kwong, 2013). A constructively aligned curriculum emphasizes two key aspects of learning to the students: what they are expected to learn and how they will be expected to make that learning evident. Hence, a constructively aligned curriculum requires that the assessment tasks be designed to unambiguously reflect the intended learning outcomes (ILOs) (Boud, 2010; McLoughlin, 2002). Paul Ramsden points out that "from a student's point of view, the assessment always defines the actual curriculum" (Ramsden, 1992, p. 187).

Despite its wide recognition as being pedagogically worthwhile, there is a concern, most often from within the Academy, that casting intended learning objectives as required thresholds may discourage students from constructing their own, personally relevant objectives (Eisner, 1985; Polanyi, 1967). In short, the argument is that the articulation of institutionally sanctioned and prescriptive learning objectives may steer students away from acquiring unintended but nonetheless worthwhile meanings, understandings and capabilities. From a sociological perspective, how the curriculum that purports to facilitate professional education or expertise is structured is a fundamental element of the academic environment (Young & Muller, 2014). Ma (2015) asks how a curriculum can be structured to accommodate both intended and unintended learning outcomes:

> If we incorporate both anticipated and unanticipated events …, how unpredictable will the ultimate learning outcomes that ensue … be? If learning objectives or outcomes are frequently or predictably derailed in unpredictable directions, how should these sessions be integrated into the existing curriculum? … how does one enable *disturbance* … to reflect authenticity? (Ma, 2015, p. 346)

Moreover, there is an equity issue in such a concern. Not all students may be capable of serendipitously acquiring unintended learning outcomes, and therefore, to include them in assessment is manifestly unfair. While not discouraging unintended learning outcomes, focus must be placed on the clearly articulated ILOs as the basis for formal assessment that articulates with professional requirements. Constructively aligning the components of a profession-oriented curriculum increases learner agency in the acquisition of professional knowledge by expressing unambiguously what needs to be learnt. Students then can make informed decisions about how they will individually and collectively strategize their learning.

A decade ago, Bill Johnson and Aileen Watson suggested that higher education had moved from an "academic-led 'supply' model to an employer-led 'demand' model of higher education" (Johnston & Watson, 2004, p. 54) and employers' they argued, demanded graduates have "key skills". Their assertion reflects the growing focus on practical rather than theoretical knowledge being the basis for induction into the professions. More recently, sociologists like Muller (2012) have argued that theoretical knowledge ought not to be left to wither at the expense of practical knowledge, arguing that its generation, development and evaluation is ultimately profession-based, and, the learning objectives and assessment tasks of profession-based curricula should reflect both professional and pedagogic theorizing (González, Moll, & Amanti, 2013; Payler, Meyer, & Humphris, 2007).

Concurrently, a number of studies have examined the relevance of constructive alignment to postgraduate courses and professional preparation programmes (Borrego & Cutler, 2010; Treleaven & Voola, 2008; Walsh, 2007). Fewer studies have focused on generalist undergraduate courses that are designed as feeder programmes to specific and mostly profession-oriented postgraduate studies as well as serving as immediate employment preparation—as is the case with the Melbourne Model. Jackson, Sibson, and Riebe (2014) examined one specific institutional graduate attribute "working effectively with others" (WEWO) as it was perceived by employers to be in the graduate's actual skill set. WEWO is a common graduate attribute and the University of Melbourne is no exception.

The ability to negotiate with and influence others effectively is widely acknowledged as a key "future-focused" skill (Fisher, 2011). However, it is also acknowledged as a skill that is difficult to teach (Callanan & Perri, 2006; Jackson & Chapman, 2012; Lang, 2009). Denise Jackson and her colleagues report that students generally accepted that teamwork was an important factor of employability in their fields, and generally considered themselves collegially capable. Significantly, students' estimation of their WEWO capacity has been found to be significantly at odds with that of their employers (Institute of Directors, 2007). Such finding are essential to the current study in that they "indicate the important role of constructive alignment in the development of employability skills at an undergraduate level, with empirical evidence linking student perceptions of developing WEWO behaviours with pedagogical practices of class activities and assessment items" (Jackson et al., 2014, p. 15).

Jennifer Rowley and her colleagues (Rowley, Scanlon, Laing, Smith, & Treleaven, 2014) found that the lack of constructive alignment is the single most influential cause of the (perceived) tension between institutional graduate attributes and professional standards and expectations. They also found that rather than being the result of impositions enforced by the institutional hierarchy, the tension is to a large extent caused by processes internal to individual faculties. In practice, these results indicate both the necessity and the difficulty of constructively aligning ILOs to both graduate attributes and professional standards, which in turn creates challenges for assuring the quality of learning.

One identified benefit of constructive alignment relates to what Anderson (2012) identifies as the "pressure [that] has emanated from international employers keen to recruit graduates who possess more than subject knowledge and professional skills" (Anderson, 2012, p. 9). There has been a growing "dissatisfaction with the attributions of the individuals they recruit from our universities" (Barrie, 2007; Bath, Smith, Stein, & Swann, 2004; Harvey, 2000; Hesketh, 2000). At a surface level, much of such dissatisfaction is the apparent disconnect between the attributes graduates display and those that the university claims they have acquired. Amongst the factors identified by Bath and his colleagues (2004) as contributing to the emergent emphasis by employers on generic attributes are the changing relationship between education and employment and the growing use of outcome measures as indicators of quality. To this end, universities are increasingly being required to assure employers that its graduates do indeed possess the skills, knowledge and values that are ascribed to them.

Beyond the validation of certified graduate attributes, there is a growing concern that what is being taught in universities as professional expertise is increasingly limited to quantifiable items, simplified notions of theoretical and practical knowledges. Winch (2014) argues that today's professionals need much more than simply a base level of knowledge, a base level of skill and an ability to use both purposefully *in situ*. That knowledge, those skills and that capacity needs to employed with a consideration of its effect beyond the task and occupation. This, Winch argues, is essential in a curriculum that seeks to inculcate profession-based expertise.

2. Context

The structure of the University of Melbourne's so-called "New Generation" degrees demands a carefully designed articulation between a broad-based, generalist undergraduate degree and a specialist, discipline-specific postgraduate degrees because each undergraduate degree can form the basis for a number of postgraduate degrees located in disparate faculties. One example is the Bachelor of Environments (B.Envs), an undergraduate programme that serves as a springboard to Master degrees in School of Design; School of Engineering; Graduate School of Land and Environment; Graduate School of Information and the Graduate School of Education. Of those, only the School of Design is part of the Faculty of Architecture Building and Planning, which is the home faculty of the B.Envs.

Adding another layer of administrative and pathway complexity is the fact that individual subjects in the B.Envs may be taught out of the Melbourne School of Land and Environment, the Faculty of Engineering, the Faculty of Science as well as the Faculty of Architecture Building and Planning. In effect, this results in different providers assuming responsibility for individual Majors in the B.Envs, of

which there are 10: Architecture, Construction, Engineering Systems, Environmental Geographies, Environmental Science, Landscape Architecture, Landscape Management, Property, Spatial Systems and Urban Design and Planning.

Further, there are various undergraduate pathways to some of the Master's degrees. For example, a place in the Master of Geomatics degree programme can be attained by way of either a B.Envs or a Bachelor of Science. However, the entry requirements for the Bachelor of Science is significantly higher than that for the B.Envs, particularly in regard to pre-tertiary Mathematics, and consequently the failure rate in the common subjects is substantially higher amongst the B.Envs students than the Bachelor of Science students. To add to the complexity, the Master of Geomatics programme is not delivered either by the Faculty of Architecture, Building and Planning or by the Faculty of Science, but by the Faculty of Engineering.

While the above is an abridged outline of the structure, it serves to indicate the point that to accurately map the B.Envs curriculum is a complicated process. However, it is also an essential exercise for two major reasons. First, feedback from students, employers and other key stakeholders indicates that there is a lack of clarity in terms of perception of what the B.Envs actually is. The term "Environments" has created confusion, especially where it is equated with environmentalism and activism. Second, the lower entry requirement has created the notion that it is an "easy" pathway into a university that prides itself on its high standards[1]. A detailed curriculum mapping can go some way to addressing these issues in that it allows assurance that development is sequential, that delivery is consistent and importantly that students recognize and value that the course in which they are enrolled is meeting industry expectations.

3. Aligning graduate attributes

The paper proceeds with an analysis of documents that articulate ILOs at the institutional, degree and subject levels. As a first step, the graduate attributes of the B.Envs (University of Melbourne, 2015) were plotted against the University's (University of Melbourne, 2014) to allow a comparison between the two. Table 1 indicates that there is an obvious constructive alignment in that the latter articulates with the former as a subset. Each of the University's nine undergraduate degrees have some leeway to articulate how their individual interpretations of the institutional graduate attributes are evident in their own. The accordance in this case sees the degree's graduate attributes to be the contextual manifestation of the institutional graduate attributes: the B.Envs unsurprisingly focuses on the global physical context with a predominance of skills and profession-related competencies. As such, it makes evident the link between pedagogic theory and professional practice, a point that becomes more obvious later.

In brief, the graduate attributes of the B.Envs were conceived to reflect those of the University in the specific context of further study or employment in professions that are concerned with the built and natural environments. By way of illustration, the assertion that Melbourne University graduates "are adept lifelong learners who generate bold and novel ideas by critically evaluating alternative possibilities and viewpoints" becomes more specific as a B.Envs graduate as someone who "well versed in the traditions and norms of their discipline, [embraces] the creative and entrepreneurial opportunities afforded by blue-sky and green-field thinking". Moreover, although the characteristic is now focused on the Environment, it remains broad enough to be interpreted more definitively for a particular major within the B.Envs degree. Although it is beyond the scope of this paper, the graduate attribute of a B.Envs graduate with, say, a Landscape Architecture major is articulated as "… committed to continuous learning and research to inform the planning and design of open spaces towards increased social and ecological wellbeing locally, regionally and globally". The cascading structure seeks to ensure that there is an articulation of the very specific undergraduate degree with the set of very general institutional outcomes.

The paper now moves to discuss how that process might be made manifest in practice.

Table 1. Alignment of institutional and degree graduate attributes	
University	**Bachelor of Environments**
Academic distinction	
A Melbourne degree provides graduates with in-depth knowledge of their specialist disciplines and skills in examining issues with multiple disciplinary perspectives. Melbourne graduates are critical, creative thinkers with strong reasoning skills. They can apply knowledge, information and research skills to complex problems in a range of contexts and are effective oral and written communicators	Using techniques, approaches and knowledge from Science, Engineering, the Social Sciences, the Humanities and the Arts, graduates of the Bachelor of Environment degree have developed a broad view of the global physical context. They are able to approach crucial issues such as global warming, urbanization and construction in a considered and measured manner, based on rigorous analytical and research skills
The Melbourne educational experience prepares graduates to be entrepreneurial and innovative thought leaders. Melbourne graduates bring research and enquiry skills to challenges in their workplaces and communities. They are adept lifelong learners who generate bold and novel ideas by critically evaluating alternative possibilities and viewpoints	Graduates can identify the elements of a problem, devise a strategy for arriving at an innovative, creative and workable solution and execute the plan to a comprehensive and successful completion. Well versed in the traditions and norms of their discipline, they embrace the creative and entrepreneurial opportunities afforded by blue-sky and green-field thinking
Active citizenship	
Melbourne graduates have engaged with contemporary local, national and global issues and developed an appreciation of the Asian region. They have a high regard for human right, social inclusion, ethics and the environment. Melbourne graduates are aware of the social and cultural diversity in communities and can work collaboratively with people from diverse linguistic and cultural backgrounds. In particular, they have an understanding of and deep respect for Indigenous knowledge, culture and values	Bachelor of Environments graduates are well placed to contribute pro-actively and beneficially to the natural, human and constructed environment at the local, national, regional and global levels. They have a genuine appreciation of cultural, biological and geographical diversity in communities, with a practical regard for human rights and social justice
The Melbourne experience supports a commitment to civic service in graduates' lives and careers, equipping them to be active, well-informed citizens who make substantial contributions to society. Graduates have the potential to be leaders in their professions and communities, with the capacity to work effectively across disciplines and cultures. Through advocacy and innovation, they are able to lead change for a sustainable future	B.Envs graduates are well prepared as pro-active community members and citizens, and to assume leadership roles in their professions. They are also well prepared to continue to postgraduate study in a wide range of professional fields
	B.Envs graduates have a respect for Indigenous knowledges, cultures and values, based locally on an informed understanding of its pre-eminent place in Australian history, geography and contemporary culture, and globally on the respectful and informed consideration of individual contexts
Integrity and self-awareness	
Melbourne graduates are motivated, self-directed and well-organized, with the ability to set goals and mange time and priorities. They are able to work effectively both independently and in groups. They are also highly self-aware and reflective, with skills in self-assessment, and place great importance on their personal and professional integrity	B.Envs graduates have demonstrated a capacity to complete tasks, briefs and projects efficiently and effectively, by working individually and collaboratively; by being self-critical, self-disciplined and self-directed and by retaining the integrity of the purpose, process and the product throughout
The opportunities offered by the Melbourne experience help prepare graduates who are enthusiastic, self-assured and confident of their knowledge, yet flexible, adaptable and aware of their limitations. Melbourne graduates are willing to explore, experiment and learn from mistakes. They have empathy and concern for the welfare of others and can manage their own well-being	They set clear, agreed goals and proceed purposefully to achieve them. They communicate effectively in a range of media that includes oral, written and graphic
	B.Envs graduates are confident and self-assured in their skills and knowledge base, they are enthusiastic and willing in their professional practice and they are empathetic in their dealings with others

4. Realigning the B.Envs curriculum

Much has been reported about the problematic nature of developing effective curricula of multidisciplinary degrees, particularly in the professions targeted by the B.Envs (Caporali, Catelani, Manfrida, & Valdiserri, 2014; Falcone, Sanchis, Lopez-Martin, Milagros, & Alejos, 2014; Martí, Feliu, & Varga, 2014; O'Byrne, Dripps, & Nicholas, 2015). However, two aspects are crucial. First, a rigorous and convincing

framework for the task must be constructed and articulated clearly to the participants. Second, participants in the design, development and delivery of the curriculum must be willing to contribute openly and collaboratively (Biggs, 2014; French et al., 2014; Pearce & Edwards, 2014; Roberts, 2015). In practice, the willingness of participants to contribute purposefully to the process was more problematic because exogenous factors that centred primarily on concerns about professional autonomy and authenticity outweighed the number of pedagogy-based contributing factors. The two aspects will be discussed separately.

4.1. Developing an analytical framework for the curriculum of the B.Envs

As indicated above, the process adopted a "social realist" (Shay, 2013) perspective, drawing on Bernstein (2000, 2003), Brandom (1998), Winch (2014) and Young (2014) amongst others, to emphasize that any curriculum that purports to prepare students for a profession needs to be based on the recontextualization of professional or vocational knowledge in an institutional setting as preparation for professional decision-making designed to progress over the length of the course in what Winch has termed the "ascent of learning". Hence, the degree's ILOs are most often cast as higher order skills and competencies rather than theoretical knowledge sets, with an implied understanding that those skills will be learnt and examined in the context of the relevant profession-based knowledge sets. This reflected at the discipline major level of ILOs, at which stage the learning outcomes include a greater distinction in theoretical knowledge and profession-specific skills. In terms of constructive alignment, the disciplinary majors' ILOs are couched as subsets of the degree's learning outcomes.

A social realist analytical structure also reflects the proposition that a curriculum designed to prepare students for a profession ought to focus on ILOs and aligned assessment tasks by way of which those learning outcomes can be observed rather than simply didactically presenting and testing specified content in an unrecontextualized structure. As Kotzee (2014) demonstrate, adopting a social realist perspective affects the recasting of a professional curriculum. In summary, curriculum renewal requires not only a reconsideration of ILOs away from content to competence, but also readjustment in terms of professional capacity.

In order to begin the process of recasting the learning objectives of each of the disciplinary majors of the B.Envs, a set of degree specific learning outcomes was devised as a subset of the institutional learning outcomes (University of Melbourne, 2015). Each year, the degree course is internally reviewed and over the decade of its existence as a New Generation degree, it has also been externally reviewed three times. Further, each disciplinary major is subject to profession-based scrutiny and reportage. The degree's learning outcomes are an amalgamation of each of those sources, articulated in the same manner as the University's generic learning outcomes. Table 2 presents the two sets of learning outcomes in tabulated form.

Basing the re-alignment process on a social realist perspective provided a stable framework for the degree's curriculum scan. Subsequent to a short but intense workshop on creating learning-based learning outcomes, programme coordinators were asked to provide a set of disciplinary majors' learning outcomes expressed in the same form. Maintaining the course's adherence to professional guidelines, coordinators were asked to recast ILOs from a learner's perspective. It was interesting to note that discipline majors that had largely theoretical knowledge-based learning outcomes had greater difficulty in recasting them according to those criteria that those that had largely competence-based learning outcomes. However, as a further record of the process, it was also noted all but one of the disciplinary majors completed the task.

Table 3 presents one example of a disciplinary major's recasting of its ILOs. Reflected in the ILOs of the disciplinary major is the subtle but significant change of theory or "knowing that" to systemic knowledge, the pool of theoretical knowledge that Urban Planners and Designers are assumed to have access to. The skill-based learning outcomes are designed to show functional competence in accessing, using and creating profession-based systemic knowledge. In social realist terms, the focus is not on any individual knowledge structures bound by set disciplinary borders, called *singulars* by

cogent ·· education

Table 2. Alignment of institutional and degree learning outcomes

University	Bachelor of Environments
Melbourne's graduates have demonstrated:	As well as the attributes generic to all University of Melbourne alumni, Bachelor of Environments graduates have demonstrated that they:
• an in-depth knowledge of their specialist disciplines;	• have a broad and interconnected knowledge of the built and natural environments;
• skills in examining issues with multiple disciplinary perspectives;	• have a deep knowledge of one specialized area of study;
• critical, creative thinking skills and strong reasoning skills;	• are qualified to pursue further study or employment in a range of occupations;
• expertise in applying knowledge, information and research to complex problems;	• can select, combine and apply effective problem solving skills to a range of tasks;
• highly effective oral and written communication skills;	• work efficiently both individually and collaboratively;
• the ability to engage with contemporary local, national and global issues and developed an appreciation of the Asian region;	• can communicate clearly in a wide range of contexts, in written, oral and graphical formats;
• a high regard for human rights, social inclusion, ethics and the environment;	• are committed to continuous learning;
• awareness of the social and cultural diversity in communities;	• are committed to ethical practice and the social justice implications of the built and natural environments; and
• skills in working with people from diverse linguistic and cultural backgrounds;	• have a meaningful respect for Indigenous knowledges and practices in relation to physical, spiritual and cultural environments.
• an understanding of and respect for Indigenous knowledge, culture and values.	

Table 3. Alignment of B.Envs and "Urban Planning and Design" intended learning outcomes

Intended learning outcomes	
Bachelor of Environments	**Urban planning and design major**
As well as the attributes generic to all University of Melbourne alumni, Bachelor of Environments graduates have demonstrated that they:	As well as the attributes generic to all University of Melbourne and Bachelor of Environments alumni, graduates majoring in Urban Planning and Design will have demonstrated that they:
• have a broad knowledge of the built and natural environments	• can articulate the main theories accommodated in the science of climate change
• have a deep knowledge of one specialized area of study.	• can identify the trends and factors which shape the spatial economics and development of local, national, regional and global communities
• are qualified to pursue further study or employment in a range of occupations.	• integrate the economics of land and property development, feasibility studies sound economic and spatial planning practices to support sustainable development.
• can apply effective problem solving skills to a range of tasks	• can access and use the related theory, leading concepts and principles of urban design appropriately
• work efficiently both individually and collaboratively	• have mastered the principal components of project management
• can communicate clearly in a wide range of contexts, in written, oral and graphical formats.	• can address and resolve the causes of conflict in negotiation.
• are committed to continuous learning	• behave ethically in all aspects of professional practice
• are committed to ethical practice and social justice	• are committed to equity and social justice for all strata and strands of society
• have a deep and demonstrated respect for Indigenous knowledges, cultures and values based on understanding and empathy.	• accommodate in praxis the complex frailty of environmental systems that may be affected by the results of urban planning and design.

Bernstein, but on the integration of relevant structures into the regions that collectively form the field of Urban Design and Planning in practice. Regions are conceptualized as sources of present and future profession-specific knowledge. The third group of ILOs addresses the notion that accessing, using and creating knowledge has consequences. One of the defining characteristics of a profession is that it has within it a code of ethics, and acceptance of social responsibility beyond the internal knowledge structures of its own region.

4.2. Overcoming faculty reluctance

Oliver (2013) argues that an institution's aspiration to and achievement of excellence is captured in its graduate attributes, with the correlation that they enhance employability in terms of having appropriate skills, knowledge and values that make graduates "more likely to secure employment and be successful in their chosen occupations to the benefit of themselves, the workforce, the community and the economy" (Yorke, 2006, p. 8). However, as Rowley et al. (2014) point out, aligning ILOs and evidentiary assessment tasks with both graduate attributes and professional standards is currently not standard (or common) practice, despite the weight of evidence that confirms the strategy as beneficial in terms of quality assurance of both learning and teaching.

The most obvious obstacle to constructively aligning the B.Envs curriculum is the entrenched attitudes to change exhibited by senior members of the academic staff. This was not entirely unexpected because academics have a tendency to characterize the quality of their teaching in terms of professional expertise and achievement in their individual discipline rather than in terms of learning outcomes or institutional goals and obligations (Erisman, 2009; Koslowski, 2006). However, Erisman (2009) maintains that resistance can be overcome with pro-active, interventionist leadership, educational outreach efforts and broad-based faculty involvement in all stages of the process. Nonetheless, she also acknowledges that some staff are chronically resistant to any idea of institutional oversight of quality assurance processes for learning-centred accountability purposes, often maintaining that the autonomy, authority and authenticity of the disciplines demand a specificity in the ILOs that cannot be accommodated in institutional graduate attributes. Erisman contends that they are not mutually exclusive.

The strategy adopted in this case was to make all participants aware that education has its own extant pool of professional knowledge, because the coordinators of each of the disciplinary majors initially conceived themselves as being members of their profession, as indeed most are. As such, their initial standpoint was defensive: the guardian of their course's accreditation by their relevant professional bodies. The underlying purpose of meetings, workshops and conversations was that each coordinator recognized the benefits of recontextualizing professional knowledge for the purposes of devising a curriculum that supports the epistemic ascent of professional learning (Young & Muller, 2014).

Although overall the strategy achieved reasonable results, there were two aspects that warrant the reconsideration of its appropriateness. First, the collaborative/explicative process was very labour-intensive and time costly. The aim of the strategy was to ensure that all stakeholders made the decision to work collaboratively for the success of the project on the basis of conceptual understanding of the social realist framework of curriculum renewal. Accepting that concept, however, was idiosyncratic and unpredictable, resulting in widely scattered achievements over an unacceptably long period of time. Whereas some coordinators grasped the point of the exercise very quickly and recast their learning outcomes in accordance with the strategy, others were less open to change, which brings up the second aspect. One coordinator simply refused to cooperate, claiming that the intended learning objectives of all the subjects in his course were, and had always been, adequate as they were—despite some of those subjects consistently receiving the lowest student satisfaction ratings, particularly for organizational issues. Such intractable resistance may take generational change rather than individual change (see Douglass, Thomson, & Zhao, 2012).

5. Conclusion

The strategy of using curriculum mapping as the initial phase of constructively aligning ILOs with graduate attributes has become a key aspect of the international higher education sector (Crosthwaite, Jolly, Brodie, Kavanagh, & Buys, 2012). An accurate curriculum map affords the ability to articulate in detail how the institutional and degree stated outcomes have been demonstrated by the graduate during the course of his or her learning. Whereas other perspectives question the focus of curriculum mapping on outcomes (Wang, 2014), the social realism framework adopted for this analysis recognizes the distinct, primarily profession-based knowledges as well as the common generic skill set that graduates of the B.Envs are expected to have evidenced.

To emphasize the importance of recontextualization as a practical strategy in curriculum renewal, not only do professional institutes require detailed information of learning, the Australian Universities Quality Agency also requires that graduate attributes be embedded in curricula (Barrie, Hughes, & Smith, 2009). Seen in the context of development rather than remediation, "[t]esting how and where employability-related learning is incorporated into a course curriculum, and that this is far more effective than focusing on what occurs in individual units (subjects or modules)" (Yorke & Knight, 2004, p. 10) reduces overlap and confusion and increases coherence in the degree (Freeman, Hancock, Simpson, & Sykes, 2008). It also serves as a means of providing equivalency of learning (Jackson, Watty, Yu, & Lowe, 2006) for mobile students. In order to avoid a discrepancy between the ILOs and the institution-sanctioned graduate attributes (Treleaven & Voola, 2008), a focus needs to be maintained on the opportunities provided for students to demonstrate the intended outcomes.

Most academic staff accept that it is important to both the university and the students that graduate attributes should be embedded in the curriculum (Radloff et al., 2009), but in practice "there is, to some degree, a lack of 'buy in' by academic teaching staff in Australian universities" (Barrie, Smith, Hughes, & Thomson, 2009, p. 14). From that perspective, a variety of hurdles stand in the way of the implementation of the process: ranging from understanding how to articulate meaningful learning objectives to seeing the exercise as a threat to professional autonomy or authority (Oliver, 2010; Radloff et al., 2009). In a multidisciplinary undergraduate degree like the B.Envs, there is the suggestion that the broad commonality of the degree means that it isn't until students complete the disciplinary major's capstone subject in the final year that graduate attributes ought to be evidenced.

The current study has replicated the earlier findings. However, it has also found agreement with Owen, Davis, Coper, Ford, and McKeough (2009), who reported that the use of a template for alignment purposes proved successful in getting (nearly) all contributors to provide scans that facilitated clear analysis. Adopting a social realism framework for professional learning allows the focus of pedagogic analyses of multidisciplinary undergraduate degrees to be on the observed learning outcomes that result from constructively aligning the curriculum. The analysis of the B.Envs indicates that the framework does not "distinguish the intra-subject re-contextualisation … from … the professional re-contextualisation" (Young & Muller, 2014, p. 9) in terms of disciplinary knowledge, either in application or theory. Finally, much remains to be done in developing the extent to which professional knowledge, especially in terms of practice, is to be theorized and standardized. At the same time, there are numerous aspects of professional education that require further analysis and more practice-based substantiation in terms of its professional efficacy.

Author details
Andrys Onsman[1]
E-mail: andrys.onsman@unimelb.edu.au
ORCID ID: http://orcid.org/0000-0003-4271-125X
[1] Melbourne Centre for Studies of Higher Education, University of Melbourne, Melbourne, Australia.

Note
1. At the time of writing, the University of Melbourne is ranked 1 in Australia and 44 in the world according to Shanghai JiaoTong.

References
Anderson, N. (2012). Achieving higher education graduate attributes in the area of creativity, innovation and

problem solving through the use of design thinking. *QS Apple Conference Proceedings,* 16-18 November 2011, *7,* 29–33. Manilla.

Barrie, S. (2007). A conceptual framework for the teaching and learning of generic graduate attributes. *Studies in Higher Education, 32,* 439–458. http://dx.doi.org/10.1080/03075070701476100

Barrie, S., Hughes, C., & Smith, C. (2009). *The national graduate attributes project: Integration and assessment of graduate attributes in curriculum*. Retrieved from http://www.altc. edu.au/resource-national-graduate-attributes-project-sydney-2009

Barrie, S., Smith, C., Hughes, C., & Thomson, K. (2009). Quality assurance: The way a higher education system, university or discipline monitors and assures the development of graduate attributes is one of the most influential drivers of effective implementation. In *The national GAP issues papers: Key issues to consider in the renewal of learning and teaching experiences to foster graduate attributes* (pp. 16–17). Retrieved from http://www.itl.usyd.edu.au/ projects/aaglo/pdf/AAGLO_Summary%201_Final.pdf

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,* 313–328.

Bernstein, B. B. (2000). *Pedagogy, symbolic control, and identity: Theory, research, critique* (No. 4). London: Rowman & Littlefield.

Bernstein, B. B. (2003). *Class, codes and control: Applied studies towards a sociology of language* (Vol. 2). London: Psychology Press.

Biggs, J. (1996). Enhancing teaching through constructive alignment. *Higher Education, 32,* 347–364. http://dx.doi.org/10.1007/BF00138871

Biggs, J. (2003). Constructing learning by aligning teaching: Constructive alignment. In J. Biggs & C. Tang (Eds.), *Teaching for quality learning at university* (2nd ed.). (pp. 11–33). Wiltshire: Open University Press.

Biggs, J. (2014). Constructive alignment in university teaching. *HERDSA Review of Higher Education, 1,* 5–22.

Borrego, M., & Cutler, S. (2010). Constructive alignment of interdisciplinary graduate curriculum in engineering and science: An analysis of successful IGERT proposals. *Journal of Engineering Education, 99,* 355–369. http://dx.doi.org/10.1002/jee.2010.99.issue-4

Boud, D. (2010). *Assessment 2020: Seven propositions for assessment reform in higher education*. Sydney: Australian Learning and Teaching Council.

Brandom, R. (1998). *Making it explicit: Reasoning, representing, and discursive commitment*. Boston, MA: Harvard University Press.

Callanan, G., & Perri, D. (2006). Teaching conflict management using a scenario-based approach. *Journal of Education for Business, 81,* 131–139. doi:10.3200/JOEB.81.3.131-13

Caporali, E., Catelani, M., Manfrida, G., & Valdiserri, J. (2014, May). Environmental engineering curricula assessment in the global world. In *EGU General Assembly Conference Abstracts* (Vol. 16, p. 15280). Paris.

Crosthwaite, C., Jolly, L., Brodie, L., Kavanagh, L., & Buys, L. (2012). Making principled decisions about curriculum development: outcomes of a Realist evaluation across 13 universities. In *Proceedings of the 40th SEFI Annual Conference: Engineering Education 2020: Meet the Future (SEFI 2012)*. European Society for Engineering Education (SEFI). Thesaloniki.

Douglass, J. A., Thomson, G., & Zhao, C. M. (2012). The learning outcomes race: The value of self-reported gains in large research universities. *Higher Education, 64,* 317–335. http://dx.doi.org/10.1007/s10734-011-9496-x

Eisner, E. W. (1985). *The educational imagination*. New York, NY: Macmillan.

Erisman, W. (2009). Measuring student learning as an indicator of institutional effectiveness: Practices, challenges, and possibilities. *Assurance in Education, 14,* 277–288.

Falcone, F., Sanchis, P., Lopez-Martin, A., Milagros, M. P., & Alejos, A. (2014, April). The role of university-industry liaisons in achieving comprehensive curricula in engineering. In *Global Engineering Education Conference (EDUCON), 2014 IEEE* (pp. 519–522). Istanbul: IEEE.

Fisher, E. J. P. (2011). What practitioners consider to be the skills and behaviours of an effective people project manager. *International Journal of Project Management, 29,* 994–1002. doi:10.1016/j.ijproman.2010.09.002

Freeman, M., Hancock, P., Simpson, L., & Sykes, C. (2008). *Business as usual: A collaborative investigation of existing resources, strengths, gaps and challenges to be addressed for sustainability in teaching and learning in Australian university business faculties*. Retrieved from http:// www.olt.gov.au/system/files/resources/Grants_DBI_ ABDC%20Freeman%20Business%20Final%20Report_ March27_2008.pdf

French, E., Summers, J., Kinash, S., Lawson, R., Taylor, T., Herbert, J., ... Hall, C. (2014). The practice of quality in assuring learning in higher education. *Quality in Higher Education, 20,* 24–43. http://dx.doi.org/10.1080/13538322.2014.889432

González, N., Moll, L. C., & Amanti, C. (Eds.). (2013). *Funds of knowledge: Theorizing practices in households, communities, and classrooms*. New York, NY: Routledge.

Harvey, L. (2000). New realities: The relationship between higher education and employment. *Tertiary Education and Management, 6,* 3–17. http://dx.doi.org/10.1080/13583883.2000.9967007

Hesketh, B. (2000). Time perspective in career-related choices: Applications of time-discounting principles. *Journal of Vocational Behavior, 57,* 62–84.

Institute of Directors (2007). *Institute of Directors skills briefing - December 2007: Graduates' employability skills*. London: Author.

Jackson, D., & Chapman, E. (2012). Non-technical competencies in undergraduate business degree programs: Australian and UK perspectives. *Studies in Higher Education, 37,* 541–567. http://dx.doi.org/10.1080/03075079.2010.527935

Jackson, M., Watty, K., Yu, L., & Lowe, L. (2006). Assessing students unfamiliar with assessment practices in Australian universities (accounting). *ALTC project report*. Retrieved from http://www.olt.gov.au/ project-accounting-future-more-uwa-2007

Jackson, D., Sibson, R., & Riebe, L. (2014). Undergraduate perceptions of the development of team-working skills. *Education + Training, 56,* 7–20.

Jervis, L. M., & Jervis, L. (2005). What is the constructivism in constructive alignment? *Bioscience Education*. Retrieved from http://www-new1.heacademy.ac.uk/assets/Documents/ subjects/bioscience/bioscience-education-6-5.pdf

Johnston, B., & Watson, A. (2004). Participation, reflection and integration for business and lifelong learning. *Journal of Workplace Learning, 16,* 53–62. http://dx.doi.org/10.1108/13665620410521512

Koslowski, F. (2006). Quality and assessment in context: A brief review. *Quality Assurance in Education, 14,* 277–288. http://dx.doi.org/10.1108/09684880610678586

Kotzee, B. (2014). Expertise, fluency and social realism about professional knowledge. *Journal of Education and Work, 27,* 161–178.

Lang, M. (2009). Conflict management: A gap in business education curricula. *Journal of Education for Business, 84,* 240–245. http://dx.doi.org/10.3200/JOEB.84.4.240-245

Ma, I. W. (2015). Embracing complexity: Taking the messiness in simulation-based training one step further. *Medical Education, 49*, 346–348. http://dx.doi.org/10.1111/medu.12673

Martí, C., Feliu, J., & Varga, D. (2014). Geographic information technology and innovative teaching: Keys to geography degree curriculum reform. *Journal of Geography, 113*, 118–128. http://dx.doi.org/10.1080/00221341.2013.835855

McLoughlin, C. (2002). Learner support in distance and networked learning environments: Ten dimensions for successful design. *Distance Education, 23*, 149–162.

Muller, J. (2012). *Reclaiming knowledge: Social theory, curriculum and education policy*. London: Routledge.

O'Byrne, D., Dripps, W., & Nicholas, K. A. (2015). Teaching and learning sustainability: An assessment of the curriculum content and structure of sustainability degree programs in higher education. *Sustainability Science, 10*, 43–59.

Oliver, B. (2010). *Teaching fellowship: Benchmarking partnerships for graduate employability*. Sydney: Australian Learning and Teaching Council. Retrieved from http://www.olt.gov.au/system/files/resources/Oliver%20B%20Curtin%20Fellowship%20report.pdf

Oliver, B. (2013). Graduate attributes as a focus for institution-wide curriculum renewal: Innovations and challenges. *Higher Education Research & Development, 32*, 450–463.

Owen, S., Davis, G., Coper, M., Ford, W., & McKeough, J. (2009). *Learning and teaching in the discipline of law: Achieving and sustaining excellence in a changed and changing environment* (ALTC project report). Retrieved from http://www.olt.gov.au/project-learning-teaching-law-flinders-2006

Payler, J., Meyer, E., & Humphris, D. (2007). Theorizing interprofessional pedagogic evaluation: Framework for evaluating the impact of interprofessional continuing professional development on practice change. *Learning in Health and Social Care, 6*, 156–169. http://dx.doi.org/10.1111/lhs.2007.6.issue-3

Pearce, J., & Edwards, D. (2014). Collaborative assessments of learning outcomes: Generating positive institutional change. Educational development in a changing world. In *ICED Conference*. Retrieved from http://www.iced2014.se/proceedings/1635_Pearce_Edwards.pdf

Polanyi, M. (1967). *The tacit dimension*. London: Routledge & Kegan Paul.

Radloff, A., de la Harpe, B., Scoufis, M., Dalton, H., Thomas, J., Lawson, A., ... Girardi, A. (2009). *The B factor project: Understanding academic staff beliefs about graduate attributes*. Retrieved from http://www.olt.gov.au/system/files/GI7-638%20RMIT%20delaHarpe%20BFactor%20graduate%20attributes%202009.pdf.

Ramsden, P. (1992). *Learning to teach in higher education*. London: Routledge. http://dx.doi.org/10.4324/9780203413937

Roberts, P. (2015). Higher education curriculum orientations and the implications for institutional curriculum change. *Teaching in Higher Education, 20* 542–555.

Rowley, J., Scanlon, L., Laing, L., Smith, L., & Treleaven, L. (2014). Improving professional learning and teaching through the development of a quality process. *Journal of Education and Training, 1*, 83–104.

Shay, S. (2013). Conceptualizing curriculum differentiation in higher education: A sociology of knowledge point of view. *British Journal of Sociology of Education, 34*, 563–582. http://dx.doi.org/10.1080/01425692.2012.722285

Treleaven, L., & Voola, R. (2008). Integrating the development of graduate attributes through constructive alignment. *Journal of Marketing Education, 30*, 160–173. http://dx.doi.org/10.1177/0273475308319352

University of Melbourne. (2014). *Learning and teaching, Melbourne graduates*. Retrieved from http://learningandteaching.unimelb.edu.au/curriculum/graduates

University of Melbourne. (2015). *Environments course guide*. Retrieved from http://www.benvs.unimelb.edu.au/sites/default/files/docs/2015-UoM-Environments-brochure.pdf

Walsh, A. (2007). An exploration of Biggs' constructive alignment in the context of work-based learning. *Assessment & Evaluation in Higher Education, 32*, 79–87.

Wang, C. (2014). Mapping or tracing? Rethinking curriculum mapping in higher education. *Studies in Higher Education*. doi:10.1080/03075079.2014.899343

Wang, X., Su, Y., Cheung, S., Wong, E., & Kwong, T. (2013). An exploration of Biggs' constructive alignment in course design and its impact on students' learning approaches. *Assessment & Evaluation in Higher Education, 38*, 477–491.

Winch, C. (2014). Know-how, knowledge and professional education. In M. Young & J. Muller (Eds.), *Knowledge expertise and the professions* (pp. 47–60). London: Routledge.

Yorke, M. (2004). *Employability in higher education: What it is—what it is not, learning and employability, series one*. Higher Education Academy/ESECT. Retrieved from http://www.employability.ed.ac.uk/documents/Staff/HEA-Employability_in_HE(Is,IsNot).pdf

Yorke, M., & Knight, P. (2004). *Embedding employability into the curriculum*. York: LTSN.

Young, M. (2014). What is a curriculum and what can it do? *The Curriculum Journal, 25*, 7–13. http://dx.doi.org/10.1080/09585176.2014.902526

Young, M., & Muller, J. (2014). From the sociology of professions to the sociology of professional knowledge. In M. Young & J. Muller (Eds.), *Knowledge expertise and the professions* (pp. 3–17). London: Routledge.

Cogent Education (ISSN: 2331-186X) is published by Cogent OA, part of Taylor & Francis Group.

Publishing with Cogent OA ensures:

- Immediate, universal access to your article on publication
- High visibility and discoverability via the Cogent OA website as well as Taylor & Francis Online
- Download and citation statistics for your article
- Rapid online publication
- Input from, and dialog with, expert editors and editorial boards
- Retention of full copyright of your article
- Guaranteed legacy preservation of your article
- Discounts and waivers for authors in developing regions

Submit your manuscript to a Cogent OA journal at www.CogentOA.com