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The use of the theory of planned behaviour to assess graduate attributes for sustainability

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ABSTRACT

Higher Education plays an influential role in societal transformation towards sustainability. An understanding of the application of sustainability learning from degree programs in a graduate's professional practice can serve as an important feedback loop for developing and advancing sustainability in higher education. A knowledge gap exists between graduate learning outcomes and employability skills, with little exploration of the methods to collect evidence of such relationships. This paper presents the results of a study to measure the uptake and application of sustainability attributes by graduates, post degree-completion. The study developed and trialled a graduate attribute assessment tool informed by the Theory of Planned Behaviour (TPB). The results demonstrate that the graduates sampled understood what was required for them to act sustainably and showed preparedness to act appropriately. However, these actions were moderated by the influence of key stakeholders and work-place contexts.

Introduction

Sustainability in higher education aims to build awareness within future professionals about the need to live within ecological limits, and to build graduate capability to ensure better social, economic and environmental relationships into the future. Due to the systemic nature of, and increasing recognition of sustainability, graduates will be part of work-places that contribute to socio-ecological challenges and/or respond to these. Sustainability education, therefore, is part of supporting graduate employability which is an increasing priority of higher education institutions in the 21st century (Down 2006). Flowing from this education is the graduate capability in sustainability, which seeks to nurture knowledge and skills that enable individuals to act in ways that align with more a sustainable future.

In order to ensure graduates' employability, an understanding of the application of sustainability learning in graduates' professional practice serves as an important feedback loop for the advancement of sustainability curriculum and learning and teaching methods in higher education. However, there is a critical knowledge gap in understanding the relationship between graduate learning outcomes and employability skills, with little exploration of the methods to most effectively collect evidence of such relationships (Blömeke et al. 2013).

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This paper presents a step along the path to measure the uptake and application of sustainability attributes within graduates, post degree-completion, and hence provide guidance for higher education institutions in their implementation of sustainability education. Within this context, the aim of the paper is to present the findings of a small research project which was undertaken to both develop a measurement tool, and to trial the tool. As a consequence of the trial, data were generated which provide some initial directions for curriculum development.

Specifically this research has led to the development of a graduate attribute assessment tool (GAAT), based on the Theory of Planned Behaviour (TPB), that was trialled with graduates from the School of Property, Construction and Project Management (PCPM) at RMIT university in 2016. The paper begins with a definition of sustainability attributes and underpinning capability, the challenges of measuring such capability and the limitations found within existing approaches. Subsequently the paper outlines how the TPB framework was used to inform the GAAT and summarises the results of the trial.

Background and context for the GAAT pilot

In relation to graduates' engagement with the work-force there has recently been an increased interest in the development of 'generic skills', or more recently 'employability skills' These refer to a range of qualities and capacities that are increasingly view as important to all situations, and include communication skills, problem solving, team work, and others. Within the Higher Education sector these are often labelled 'graduate attributes' in which graduates are expected to be able to demonstrate by the time they graduate successful achievement of such skills. The graduate attributes specify knowledge, skills and attitudes to be achieved. Within this trend there appears to be an agenda to build a bridge between study and the world of work with the individual achievement of attributes useful to potential employers. Through the Australian Quality Framework, generic learning outcomes have recently become incorporated into qualifications. Specifically, generic outcomes are transferable, non-discipline specific skills, which a graduate may achieve through learning, and which have application in their work, study and life contexts.

This research project has used RMIT University's Environmentally Aware and Responsible Graduate Attribute (EAR GA) as a case study to investigate and the trial the GAAT. Since attainment of the Attribute had not been previously assessed, the results of the trial were also expected to provide a guide for any curriculum review project. Around the world universities have developed sets of attributes which graduates are expected to have upon degree completion (Bowman 2010). For example, as part of a national framework for Australia, Barrie et al. (2009, 7) commented '(a)ll Australian universities are required as part of the AUQA audit process to show how they are embedding such attributes in the teaching of undergraduate degrees'[1]. According to the university policy:

'Graduates of RMIT will have engaged in processes to develop their abilities to recognise environmental and social impacts and to provide leadership on sustainable approaches to complex problems. Examples of how this graduate attribute can be evidenced include:

- Recognise the interrelationship between environmental, social and economic sustainability.
- Appraise and critique context-appropriate sustainability measures.
- Take responsibility for critical decision-making in ensuring sustainable outcomes.
- Appropriately apply their environmental and sustainability literacy in a highly diverse range of contexts.'

(RMIT 2015, no page)

This description and interpretation of sustainability had been determined by the university and, while it is open to debate, it is the 'goal' which graduates are expected to achieve.[2] In

essence the EAR GA is underpinned by a capability paradigm with a focus on decision making, appraisal and critique, and applying literacy in diverse contexts. For the assessment of attributes, it is important to recognise the difference between capabilities and competencies. There has been some discussion relating to the terminology associated with what is expected of graduates. Sandri et al. (2018a) provide an overview of this discussion, and an argument for use of the concept of capabilities. Specifically, a competency is a specific demonstrable skill for a particular, known task (Rychen and Solganik 2003), while capabilities are transferable across situations, giving an individual the agency to evaluate different contexts and to take the most appropriate action in that situation, drawing on their skills and competencies (Sadler 2013). This characteristic of a capability paradigm poses particular challenges to the assessment of the application of capabilities/attributes in work-place contexts (Holdsworth and Sandri 2014; Sandri et al. 2016). Given the demonstration of capability is context dependent, a person may have developed a particular capability but may not be able to demonstrate this due to social and environmental limitations (Nussbaum 2011). Therefore, a graduate may be capable even if a desired behaviour is not demonstrated.

Surveys remain the most common method for large-scale comparative studies of graduate learning outcomes which often rely on self-reporting or self-assessment of an individual's own abilities (Delaney 2004, Potts and Kleinpeter 2001, van der Velden 2013). It has been indicated that self-assessment of capability, alone, is not a reliable indicator of individual ability. Self-assessment often results in an exaggerated level of attainment and application of capability (Bath et al. 2004). There is no proven relationship between attainment of capability and a change in behaviour. Furthermore, limited research in the assessment of sustainability learning outcomes exists (Sandri et al. 2016). The most closely related type of assessment for the purposes of this study is work-place assessment found in Vocational Educational Training (VET) programs, however, this is limited by time, required resources and access/participation to graduates in their work-places. In addition, work-place assessments cannot necessarily measure a graduate's capability if their work-place does not support such behaviour (Sandri et al. 2018a, 2018b).

These insights lead to the conclusion that any graduate attribute assessment tool needs to:

- move beyond self-assessment;
- account for contexts in which capability may or may not be able to be demonstrated;
- seek information that indicates the participant's behaviour or actions in work practice, with this behaviour being a proxy for work-place capability;
- be viable on a large scale;
- link measured learning outcomes to source of their attainment.

These considerations set challenging parameters for any assessment approach. However, the Theory of Planned Behaviour (TPB) fulfils the requirements, to varying degrees, and underpinned the development and trialing of the Graduate Attribute Assessment Tool.

Method

Theoretical approach to the development of the graduate attribute assessment tool (GAAT)

The assessment of behaviour is a complicated task and several methods to undertake assessments of students' or graduates' behaviour have been discussed by Sandri et al. (2018a). While TPB shares the limitation of not surveying actual behaviour, it provides the basis of an assessment method that has the potential be a more reasonable representation than other methods (Sandri et al. 2018a) while being resource efficient (by avoiding interviews or direct observation).
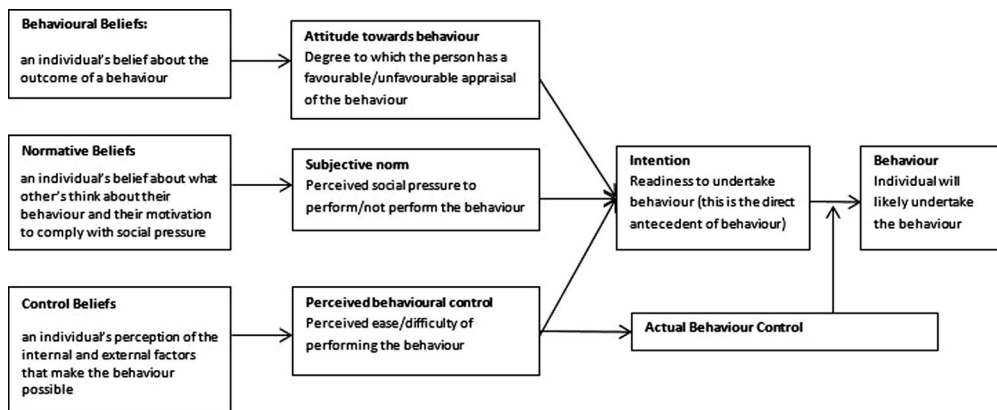
Figure 1. Components and relationships within Theory of Planned behaviour (TPB).

TPB was developed by Ajzen (1985) to predict a person's behaviour based on three indicators of behavioural intention including a person's:

- favourable attitudes toward the behaviour and perception of likely consequences of the behaviour;
- perceptions of the social norms which support the behaviour (subjective norms); and
- perceptions of behavioural controls that support the behaviour (Ajzen 2002).

The Theory of Planned Behaviour views human behaviour as deliberative and planned, with these three indicators informing a person's intention to carry out a behaviour. According to Ajzen the 'more favorable the attitude and subjective norm, and the greater the perceived control, the stronger should be the person's intention to perform the behavior in question. Finally, given a sufficient degree of actual control over the behavior, people are expected to carry out their intentions when the opportunity arises' (Ajzen 2002, 1).

In a TPB survey, Likert Scale (e.g.strongly agree- strongly disagree) questions are asked in relation to behavioural statements which measure the three indicators (including attitudes towards a behaviour, subjective norms, perceived control over the behaviour). The responses determine the strength of a person's intention, and the likelihood that they will undertake the behaviour under investigation. The intention to perform a behaviour is the direct antecedent of the actual behaviour, therefore, if belief factors (See Figure 1) are favourable towards the behaviour, and there are no external events or controls to impede the behaviour, the individual will mostly likely undertake the behaviour (Ajzen 1985).

According to the TPB framework (Ajzen 1991, 2002) a graduate is likely to apply the EAR GA attributes during their professional practice, when they:

1. have a favourable attitude towards taking action to achieve sustainability related goals and belief that their action will achieve outcomes towards these goals.
2. have peers and influential others favour such action,
3. believe they have the ability to perform the behaviour,
4. have work-place management and policy, regulatory environments and market place conditions conducive to such behaviour.

These aspects of behavioural intention, towards applying EAR GA, guided development of the piloted GAAT.

The development of the graduate attribute assessment tool survey

In order to apply the Theory of Planned Behaviour framework to the assessment of the EAR GA the first step was to define the behaviour of interest. The behaviour of interest was narrowed to the extent to which graduates make decisions, in their professional practice, that are informed by the EAR GA. However, because the EAR GA itself embodies several concepts, and therefore is difficult to assess, this single 'behaviour' was split into five 'sub-behaviours' to enable each to be assessed. These sub-behaviours, derived directly from the text and dot point wording of the EAR GA (above), were:

1. Minimise negative impacts to the physical environment (designated PE).
2. Minimise negative social/community impacts (SH).
3. Recognise environmental, social and economic relationships (ENEC).
4. Balance environmental, community and economic outcomes (BAL).
5. Evaluate a range of alternatives/responses/solutions (ALT).

Decision-making to achieve each of these sub-behaviours captures the different components of the broadly orientated EAR GA.

Furthermore, the survey questions were situated within a realistic work-place scenario which has a real work-practice based context - it is important for predictive validity of the attitudinal component of TBP that participants have some experience of the behaviour of interest, before any behaviour is assessed (Doll and Ajzen 1992). The scenario had an environmental and/or social requirement (depending on the sector) that provides context (situational proxy) for the application of the attribute (behaviour). Finally, it was written to be clearly understood and valid with respect to work undertaken in professional practice (for more information on the use of Theory of Planned Behaviour and this study see Holdsworth et al. 2019).

The scenario situated the GAAT question sets in an Australian built environment industry context, this was relevant for the graduate survey population i.e.graduate from the School of Property, Construction and Project Management at RMIT. Specifically, the scenario focussed participants to answer question based on the consideration of a piece of Australian environmental legislation the graduates had learnt in their under-graduate studies and/or wold be exposed to in professional practice.

To further define the behaviour of interest, Ajzen's (2002) TACT (Target, Action, Context and Time) framework was applied to ensure the tool's validity. This framework provides behavioural parameters for the operationalisation of the behaviour under investigation. Initially defined was the scope of the behaviour of interest, that is: making decisions in professional practice, informed by the use of environmental legislation to fulfil the outcomes drawn from the EAR GA. Then the 'target' was taken to be the graduate application of the use of environmental legislation in making decisions to fulfil the outcomes drawn from the EAR GA. The 'action' was making decisions that use the EAR GA, while the 'context' was application of key components of the EAR GA (e.g.minimise negative impacts to the physical environment) when having to juggle workplace, community and personal expectations. The 'time' was taken to be that in the workplace over the preceding 12 months.

Theory of Planned Behaviour surveys ask several questions to measure each variable of behaviour. The GAAT survey questions were grouped around the five EAR GA sub-behavioural categories discussed above, with questions formulated to measure each of the TPB variables for each of the sub-behaviours; Figure 2 illustrates the relationship between these variables and the EAR GA. As part of the development of a TPB based survey, Ajzen (1985) recommends that an elicitation study be undertaken to determine the components, which are relevant to the context of the survey and sample, of both: salient subjective norms; and perceived behavioural controls. Drawing on a group of graduate employees from the construction industry, the norms and controls listed in Table 1 were identified (see Holdsworth et al. 2018 for details of the elicitation
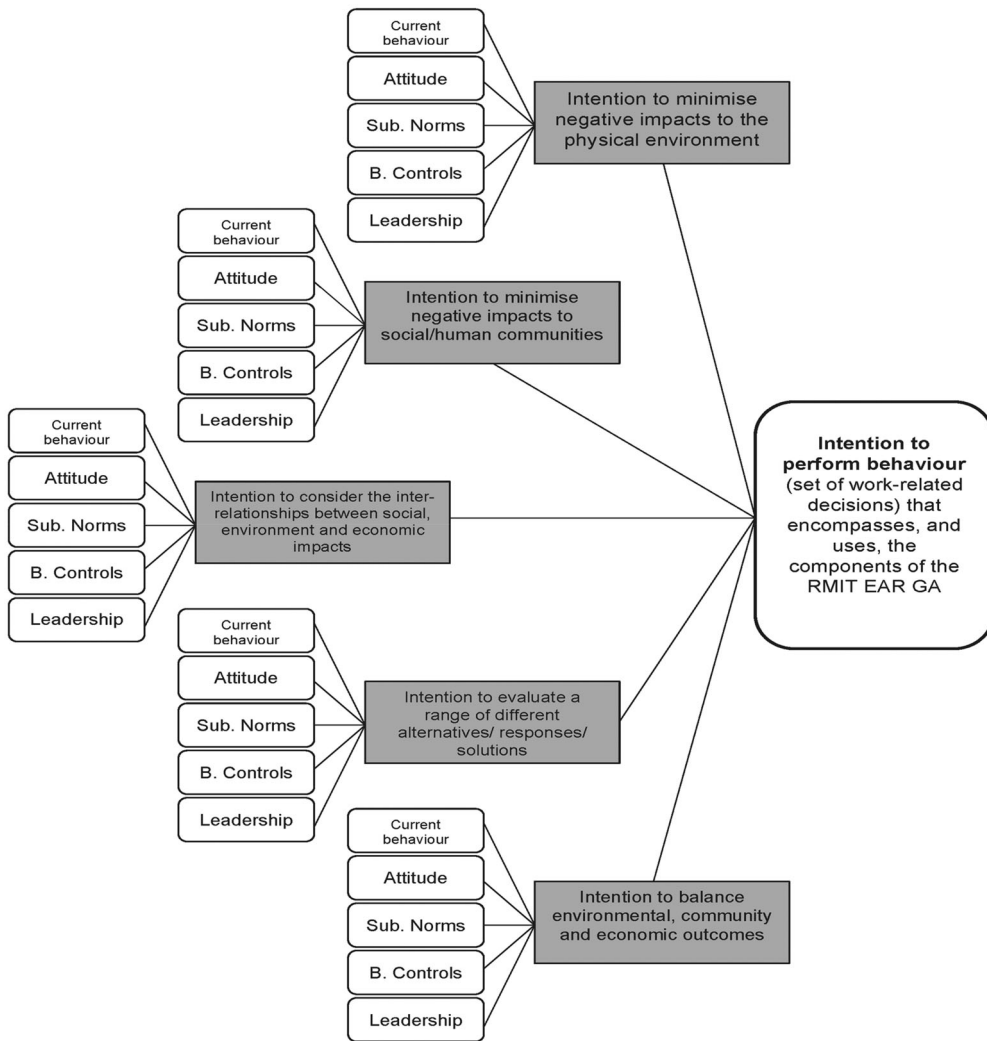
Figure 2. Relationship between the TBP sub-behavioural categories and the EAR GA (grey shaded).

study). The data from this elicitation informed the questions related to subjective norms and behavioural controls, and an example of the question sets used for the sub-behaviours is presented in Table 2, using the illustration of the 'physical environment' sub-behaviour.

To provide context for the responses, the survey included demographic questions, as well as questions to link the participants' responses, or intended behaviour, to their studies at RMIT.

The survey was pre-tested to check for any critical issues in the flow of the survey questions using cognitive interviewing, to ensure that feed-back was interpreted accurately and understood (Drennan 2003). Five, fourth year students from the Construction and Project Management program, already working in the industry, completed the survey. This stage resulted in the survey being modified based in line with Drennan's (2003) general cognitive interviewing technique.

Survey sample and recruitment methods for graduates

The survey sample comprised graduates from RMIT's School of Property, Construction and Project Management and was administered online using Qualtrics. An invitation to participate,

Table 1. Salient norms and behavioural controls amongst the survey population according to the elicitation study.

Salient subjective norms (influential stakeholders)	Salient perceived behavioral controls
• Client • Government/regulator • Market/end user • Employer (if not self-employed) • Colleagues/Peers • Family • Friends • Community	• Alternative technologies or design approaches (some may increase cost) • Market demand for cheaper products • My skills and knowledge • Objectives and policies of my work-place (if not self-employed) • Resources available (people or product) • Need for efficient use of time • My compatibility with the attitude of my work-place (how I fit in) (if not self- employed) • Legislation • Voluntary codes and guidelines My current role description • Work-place support and assistance (e.g. training, mentors) • Support and assistance from outside organisations • The scope of my current role and the power I have to influence decisions • My compatibility with my colleagues (if not self-employed) • Work-place culture (if not self-employed)

Table 2. Example of question set for 'intention to minimise negative impacts on the physical environment' sub-behaviour.

Question	Response format
1. If I were free to make my own decisions in my work-practice, I would use the EP Act and/or the EPBC Act to *minimise negative impacts*.	Response format: 5 point Likert Scale from 'Always' to 'Never'
2. The following stakeholders support my use of the EP Act and/or the EPBC Act to *minimise negative impacts to the physical environment in my work-practice decisions*.	Response format: 5 point Likert Scale from 'Always' to 'Never' for each of the influential stakeholders listed in Table 1
3. The following stakeholders oppose my use of the EP Act and/or the EPBC Act to *minimise negative impacts to the physical environment in my work-practice decisions*	Response format: 5 point Likert Scale from 'Always' to 'Never' for each of the influential stakeholders listed in Table 1
4. The following factors enable me to use the EP Act and/or the EPBC Act to *minimise negative impacts to the physical environment in my work-practice decisions*.	Response format: 5 point Likert Scale from 'Always' to 'Never' for each of the perceived behavioural controls listed in Table 1
5. In using the EP Act and/or the EPBC Act to *minimise negative impacts to the physical environment in my work-practice decisions*, I would most likely:	1. Be directed by employers/managers to do what is required 2. Be informed about the impacts of my work-related decisions and meet minimum legislative requirements 3. Go beyond minimum legislative requirements to make best-practice work-related decisions 4. Lead initiatives that support colleagues to make best-practice work-related decisions
6. I make work-practice decisions that use the EP Act and/or the EPBC Act to *minimise negative impacts to the physical environment*.	Response format: 5 point Likert Scale from 'Always' to 'Never'
7. If I were free to make my own decisions in my work-practice, I would use the EP Act and/or EPBC Act to *minimise negative impacts to social/human communities*.	Response format: 5 point Likert Scale from 'Always' to 'Never'

and link to the survey, was emailed to graduates of the School in mid-October 2016. Graduates were contacted through existing databases, Facebook and LinkedIn. Overall, 150 graduates from 2015, 107 graduates from 2014, and 39 graduates from 2013 were invited to participate in the study. In relation to a separate piece of research, associated with making contact with graduates,

Table 3. Demographic information of respondents.

	N 79	% 100		N 79	% 100
Program Completed			**Year of graduation**		
Bachelor of Applied Science (Construction Management)	59	74.7	2012	5	6.3
Bachelor of Applied Science (Project Management)	14	17.4	2013	16	20.3
Bachelor of Applied Science (Property & Valuation)	5	6.3	2014	27	34.2
			2015	30	38
Employment status			**Age**		
Employed	73	92.4	18-24	29	36.7
Student	1	1.3	25-34	47	59.5
Unable to work	1	1.3	35-44	2	2.5
Unemployed	4	5.1	45-54	1	1.3
Industry			**Gender**		
Banking & Finance	1	1.3	Male	65	82.3
Construction	62	78.5	Female	14	17.7
Education & Training	1	1.3			
Public service	1	1.3			
Real Estate & Property	6	7.6			

19 graduates also completed a hard copy of the survey. which, subsequently, was entered into Qualtrics. These completed surveys (6 graduates from 2015, 13 graduates from 2014) combined with those completed on-line gave a total of 88; a response rate of 28%.

Data analysis

Descriptive statistics and Pearson correlation analysis were conducted to investigate the strength of the relationship between the antecedents of behaviour which align to the requirements of the EAR GA. The strength of connection between variables is expressed by a correlation coefficient which could range from -1 (indicates the perfect negative correlation between variables) to 1 (shows the perfect positive correlation between variables) (Jashapara, 2003).

Results and discussion

The following present a summary of the survey results relating to the influences on graduates' behavioural intentions towards applying the EAR GA, and secondly, present the assessment of Theory of Planned Behaviour and its relationship to graduates' behaviour. Subsequently, and presented separately, are results of: the leadership component of the survey; sources of graduates' knowledge and capability; and the focus groups' discussions.

Survey demographics

The demographic data of the survey participants presented in Table 3 indicates the dominance of graduates associated with the construction sector and, while most were recent graduates, generally there was a mix of those who entered their university program straight from school (were younger) and those who had entered when older; no information was available regarding what they had been doing before undertaking their program. As could be expected in the construction industry, the vast majority were male.

Influences on graduates' behaviour: Comparing means

The following sections summarise the participants' mean responses[3] to the five sub-behaviours models: acronyms for each of the sub-behaviours are as follows: PE - Minimise negative impacts to the physical environment; SH - Minimise negative social/community impacts; ENEC - Recognise

environmental, social and economic relationships; BAL - Balance environmental, community and economic outcomes; and ALT - Evaluate a range of alternatives/responses/solutions.

The presentation of the mean responses from the five models follow the Theory of Planned Behaviour structure: Graduates' Attitudes (A); Subjective-Norms (SNorms) (both norms that Support and norms that Oppose); Behavioural Control (BvControl), and; Graduates' Actual Behaviour (BV).

Attitudes (when free to act)

For each of the five sub-behaviours, the first question participants were asked was their attitude toward the adherence to environmental legislation when making decisions in their work-place (the behaviour) if they were entirely free of restrictions (see Question 1 in Table 2). For each of the five sub-behaviour models, the Mean ranged from 1.71 to 1.88 while the standard deviation (SD) ranged from 0.74-0.78. These results indicated a favourable attitude towards making decisions that apply the five sub-behaviours, with respondents stating that 'always' or 'most of the time' they would make decisions in favour of the sub-behaviours.

Subjective-Norms

Participants were then asked to rate the level of influence different social actors, groups, or stakeholders (as defined through the elicitation study) had on their decision making, both in supporting and opposing the participants in their demonstration of the five sub-behaviours (see Questions 2 and 3 in Table 2). The Government/regulator was identified as the most *supportive* stakeholder according to the participants, this was indicated by the lowest means score (see Table 4) . The market/end user was identified as the least supportive, for most sub-behaviours; as indicated by the higher means. Also, the BAL sub-behaviour was least supported by colleagues/peers, while market/end user was the second least supportive . Notwithstanding, that the respective mean scores are less than the 3 (the mid-point of the Likert scale), the results indicate that all stakeholders are generally supportive to the participants in their demonstration of the five sub-behaviours (see Table 4).

The results showed almost identical identification of subjective norms that *oppose* the EAR GA sub-behaviours Table 5). The market/end user mostly strongly opposes graduates' application of the five sub-behaviours, with government/regulator being least likely to oppose .

From these subjective norm results, the government/regulator has the most positive influence on the graduates' EAR GA behaviour, while the market/end user was perceived to most oppose such behaviour. It was also found, to a lesser extent, those colleagues/peers, family and friends would provide the least support (if not a degree of opposition) for behaviours that aligned with sustainability attributes.

Behaviour controls

Participants were asked about the perceived behavioural controls for applying the five sub-behaviours (see Questions 4 and 5 in Table 2). As indicated in Table 6, legislation was perceived as the most influential enabling factor in graduates' behavioural intention across all sub-behaviours. However, the market desire for cheaper products was least likely to enable the EAR GA behaviours.

Graduates' actual behaviour

When graduates were asked if they make work-practice decisions that considered the five sub-behaviours (see Question 7 in Table 2) the results (see Table 7) showed a discrepancy when compared with the results for graduate attitude when free to act. In response to this question

Table 4. Subjective-norms, supportive.

Subjective Norms - Support	Physical Environment (PE)		Social/Human Communities (SH)		Environmental, Social, Economic Interrelationship(ENEC)		Balance Environmental, Community and Economic Needs (BAL)		Evaluate a range of different alternatives/ responses/ solutions (ALT)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Client	2.49	1.14	2.57	1.06	2.53	1.06	2.61	1.11	2.72	1.12
Government/ regulator	**1.90**	1.19	**1.93**	1.07	**1.93**	.98	**2.06**	1.11	**2.25**	1.20
Market/end user	2.82	1.13	2.81	1.04	2.84	1.11	2.74	1.17	2.94	1.18
Employer (if not self-employed)	2.50	1.24	2.44	1.22	2.43	1.16	2.67	1.26	2.57	1.27
Colleagues/Peers	2.54	0.96	2.63	0.98	2.69	1.01	2.81	1.05	2.71	1.14
Family	2.32	1.07	2.50	1.14	2.35	1.17	2.63	1.30	2.64	1.26
Friends	2.46	1.01	2.49	1.09	2.51	1.13	2.67	1.26	2.63	1.21
Community	2.29	1.00	2.16	1.00	2.30	1.06	2.30	1.11	2.44	1.04

Table 5. Subjective-norms, oppose.

Subjective Norms - Oppose	Physical Environment (PE)		Social/Human Communities (SH)		Environmental, Social, Economic Interrelationship (ENEC)		Balance Environmental, Community and Economic Needs (BAL)		Evaluate a range of different alternatives/ responses/ solutions (ALT)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Client	4.03	1.10	3.96	1.08	3.88	1.14	3.78	1.08	3.78	1.02
Government/ Regulator	4.48	.75	4.36	.88	4.30	1.06	4.12	1.07	4.14	1.05
Market/end user	3.97	.92	3.82	1.01	3.81	1.05	3.74	1.06	3.72	1.08
Employer (if not self-employed)	4.00	1.03	3.96	1.12	3.94	1.18	3.82	1.02	3.88	1.00
Colleagues/Peers	3.91	.88	3.88	1.05	3.88	1.04	3.78	1.07	3.84	1.00
Family	4.39	.706	4.29	.85	4.18	.96	4.13	1.10	4.12	1.09
Friends	4.35	.75	4.28	.89	4.18	.91	4.16	1.04	4.09	1.03
Community	4.24	.92	3.96	1.08	4.06	.91	3.97	.98	3.94	.99

Table 6. Behaviour controls.

Behavioural controls	Physical Environment (PE)		Social/Human Communities (SH)		Environmental, Social, Economic Interrelationship (ENEC)		Balance Environmental, Community and Economic Needs (BAL)		Evaluate a range of different alternatives/responses/solutions (ALT)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Alternative technology/design	2.46	.98	2.69	1.02	2.61	1.00	2.55	.99	2.57	.95
Market for cheaper products	*3.08*	1.15	*3.17*	1.12	*2.94*	1.06	*3.00*	1.13	*3.00*	1.07
My skills & knowledge	2.46	1.01	2.51	1.03	2.41	.92	2.48	.99	2.68	1.06
Objectives/ policies of workplace	2.41	1.12	2.5	1.10	2.44	1.04	2.49	1.04	2.57	1.07
Resources available	2.60	.97	2.68	1.02	2.69	1.05	2.69	1.08	2.68	1.03
Need for efficient use of time	2.94	1.17	2.89	1.19	2.94	1.19	2.91	1.14	2.80	1.09
Compatible workplace attitude	2.49	1.10	2.81	1.07	2.58	1.23	2.66	1.18	2.75	1.10
Legislation	**1.96**	.95	**2.01**	1.01	**2.10**	1.12	**1.98**	1.02	**2.17**	1.17
Voluntary codes and guidelines	2.32	.97	2.31	.99	2.34	1.10	2.37	1.04	2.35	1.11
My current role description	2.85	1.14	2.81	1.17	2.88	1.15	2.78	1.25	2.90	1.17
Workplace support	2.59	1.14	2.71	1.18	2.71	1.09	2.67	1.13	2.65	1.07
Support from outside	2.62	1.10	2.92	1.07	2.94	1.09	2.85	1.14	2.92	1.04
Scope of current role	2.94	1.24	2.96	1.16	2.93	1.20	2.86	1.15	2.98	1.11
Compatible with colleagues & influence	2.71	1.07	2.92	1.08	2.78	1.12	2.80	1.10	2.81	1.10
Workplace culture	2.51	1.11	2.70	1.20	2.54	1.13	2.61	1.16	2.68	1.16

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Table 7. Graduates' actual behaviour.

	Physical Environ-ment (PE)		Social/Human Communities (SH)		Environmental, Social, Economic Interrelationship (ENEC)		Balance Environmental, Community and Economic Needs (BAL)		Evaluate a range of different alternatives/ responses/ solutions (ALT)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Actual behaviour	2.98	1.18	2.72	1.11	2.83	1.20	2.85	1.18	2.75	1.17
Attitude toward the behaviour	1.80	.79	1.67	.70	1.71	.74	1.71	.76	1.88	.82

Table 8. Graduates' actual behaviour and support from Sub-Norms.

Graduate actual behaviour represented by making work-practice decisions that use EP Act/ EPBC Act to minimise negative impacts on(…)

Support from SubNorms	Physical environ-ment	Social/ human communities	Environmental, social, economic interrelation-ships	Balance environmental, community and economic needs	Evaluate a range of different alternatives/ responses/ solutions
Client	.321**	.374**	.458**	.254*	.358**
Government/ Regulator	.161	.291	.235	.264*	.330**
Market/End user	.209	.388**	.178	.185	.327**
Employer (if not self-employed)	.290**	.286*	.401**	.294*	.405**
Colleagues/Peers	.272*	.378**	.366**	.404**	.451**
Family	.168	.122	.072	.042	.071
Friends	.117	.147	.085	.078	.117
Community	.146	.075	.247*	.172	.172

**Correlation is significant at the 0.01 level (2-tailed).
*Correlation is significant at the 0.05 level (2-tailed).

respondents stated 'about half of the time' indicating that, while graduates have a favourable attitude towards the EAR GA behaviours when free to act (they would apply the sub-behaviours 'always' and 'most of the time'), in their actual practice, constrained by behavioural controls and influenced by social norms, their application is about half of the time.

Pearson correlation was used to test the relationships between the graduates' actual reported behaviour and the sub-norms that participants felt supported and opposed the application of the five-behaviours, and the results are presented in Table 8. Not all supports from sub-norms are found significantly correlated to the graduates' actual behaviour (with correlation coefficient significant at p < level). Sub-norms associated with clients, employers and colleges/peers are more impactful on (significantly correlated to) the graduate behaviours. The results suggest that overall, the work-place may have greater supportive influence on graduates' actual EAR GA. In terms of opposing sub-norms, while all may have some influence, none are individually, or collectively, influential on actual reported behaviour.

Similarly, Pearson correlation analysis was conducted to investigate the relationships between the graduates' actual reported behaviour and the behavioural controls that participants felt supported and opposed the application of the five-behaviours. The results are presented in Table 9. Significant correlations (with $p < 0.01$) were found in most of the combinations. However, it is apparent that, in terms of correlation coefficients, the impact of the behavioural controls on 'physical environment' and 'social/human communities' are generally weaker than those on all other sub-behaviours (such as 'environmental, social, economic interrelationships').

Interestingly, some behavioural controls are found more versatile than the others in terms of their significant correlations across all sub-norms. Looking into the nature of the versatile sub-norms, many of them are relevant to the influence of a client, while the behavioural control was identified to be external organisations (i.e.an external influence). An illustration of this situation would be that within the construction sector initiatives to minimise environmental impacts add additional costs and time to projects (Ang and Wilkinson 2008). Then, to undertake 'minimising' actions, the client must initiate or approve such costs. This may require the graduate to seek support from external organisations such as government, financial institutions, and professional bodies to convince the client that such initiatives are worthwhile (as discussed by Opoku, Cruickshank, and Ahmed 2015).

In order to undertake behaviours that minimise harm to the social/human sphere the sub-norm identified as influencing actual behaviour was the market/end user and colleagues/peers; while the behavioural control were the participants' skills and knowledge, and position

Table 9. Graduates' actual behaviour and behavioural control.

Graduate actual behaviour (Make work-practice decision that use EP Act/ EPBC Act to minimise negative impacts on)

Behavioural control	Physical environ-ment	Social/human communities	Environmental, social, economic interrelationship	Balance environmental, community and economic needs	Evaluate a range of different alternatives/ responses/ solutions
Alternative technologies or design approaches	.273*	.086	.376**	.356**	.324**
Market demand for cheaper products	.248*	.157	.338**	.408**	.265*
My skills and knowledge	.362**	**.467***	.514**	.424**	.462**
Objectives and policies of my work-place (if not self-employed)	.318**	.400**	.553**	.370**	.435**
Resources available (people or product)	.382**	.330**	**.652***	.343**	.424**
Need for efficient use of time	.377**	.297*	.579**	.507**	.363**
My compatibility with the attitude of my work-place (how I fit in)	.325**	.261*	.520**	.465**	.442**
Legislation	.229*	.377**	.352**	.470**	.293*
Voluntary codes and guidelines	.364**	.319**	.241*	.255*	.272*
My current role description	**.422***	**.465***	.637**	.457**	.633**
Work-place support and assistance (e.g. training, mentors)	.381**	.440**	.558**	.482**	.366**
Support and assistance from outside organisations	**.444***	.345**	.589**	.379**	.460**
The scope of my current role and the power I have to influence decisions	.433**	.308**	.586**	**.569***	**.549***
My compatibility with my colleagues (if not self-employed)	.376**	.377**	.566**	.423**	.323**
Work-place culture (if not self-employed)	.370**	.295**	.534**	.500**	.308**

*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

description. Within the construction industry, the legacy of a construction project is the social and human capital that derives from the amenity of the infrastructure/dwelling built. Such outcomes may be only indirectly related to graduates in their construction roles, and are not traditionally given much consideration. Consequently, given an absence of priority for social outcomes, it comes down to the knowledge and skill of the individual, and their position within the organisation, to introduce social considerations (Dong and Wilkinson 2007)

Social influence over behaviours that recognise the relationship across the triple bottom line (environment, society and the economy) in decision making was dominated by the client, while

the chief behavioural control identified was resources available to the graduate. In the construction context, this reflects an industry for the main dominated by financial decision making, and the outcomes recognise the need to support alternative ways of thinking if the industry is to evolve (Opoku, Cruickshank, and Ahmed 2015).

For the sub-behaviours, both 'balance environmental, community and economic needs', and behaviour that 'evaluates a range of alternatives/responses/solutions' were essentially the same. The sub-norm most strongly correlated to influencing actual behaviour was the grouping colleagues and peers, while the behavioural controls were identified to be both the scope of the employee's role and power to influence others.

Sources of knowledge about sustainability

Questions about the sources of sustainability related knowledge were asked in order to link the participants' behavioural intentions with learning from the graduates' studies, or elsewhere. Analysis indicated that for participants, studies at RMIT were the important contributor to their sustainability related knowledge most of the time. The Physical Environmental knowledge was an exception to this, with work experience being most important, followed closely by studies at RMIT. Much less influential were, social media and government or public campaigns, programs or information.

Discussion

The results indicate the educational experiences within RMIT's programs are effective in development of the EAR GA, and that participants understood the necessary actions to behave in line with sustainability. Furthermore, participants were prepared to demonstrate the EAR GA behaviours in their work practice when free to make their own decisions across the five sub-behaviours of the EAR GA. While graduates had absorbed the attribute in terms of a graduate's actual behaviour, their behaviour was influenced by some opposing work-place factors. The GAAT identified that the participants' behaviour was noticeably influenced by external social norms (stakeholders) and behavioural controls (external factors) within their work-places that limited their behaviour in applying the EAR GA. Legislation and regulation was the dominate driving supportive factor to behaviours that align with the EAR GA; however, the antecedent to these behaviours was identified as the social context within which the graduate lived and worked. For graduates to apply the elements of the EAR GA in their professional practice, external contexts would need to shift to be more supportive of such behaviour. Of the behavioural controls that act to influence behaviour, the most influential were those that linked to a graduate's ability to exert influence within their workplace through their perceived skill and subsequent action/behaviour; directly related to this is the level of resources provided by their work-place, their role and influence, and external organisation support.

The survey indicates that education that enables graduates to think in alternative ways to traditional practice is important, if their industry is to evolve and decisions aligned to the EAR GA are to be achieved. Additionally, if a graduate's work-place does not support such behaviours and the client does not champion new behaviours, then a 'business as usual' approach will continue, regardless of the legislation, top-down initiatives to enforce change and broader community desire.

Graduates participating in the survey generally have not shown leadership for sustainability in their work-places. Instead they indicate that they are prepared to be directed by managers, or they limit themselves to being informed. In a minority of situations, however, graduates have been able to go beyond the minimum, or take a lead on sustainability, mainly in relation to minimising impacts on the physical and social environments. This finding suggests that while the

graduates are knowledgeable and supportive of sustainability actions, in the work-place they are restrained. Given the participants demonstrate a strong connection to sustainability, when free to do so, the indication is that they would be capable of promoting sustainability action to others. Hence, where curriculum changes are possible, efforts to reduce the effect of work-place influences and restraints could enable graduates to take a stronger role in leadership for sustainability.

Broadly, it is clear that their courses/subjects in Sustainability Education have been effective, for the disciplinary group tested, in establishing both the knowledge of sustainability and the will to act on these principles in their work-places. The data produced by the tool in terms of graduate intention, the perceived external restrictions and enablers of the intention provide a feed-back loop by which teaching staff and curriculum designers can use the results to review the relevance of their curricular, addressing a critical limitation of existing measurement tools.

This observation indicates that there are opportunities for future curriculum development. In particular, the research indicates the need to provide students with confidence to engage with and overcome external influences on their sustainability behaviour once they have entered the workforce; by developing the necessary experiences through content, tasks and learning experiences. These experiences could also enhance graduate leadership capability. Broadly though, the findings demonstrate the use of TPB as the basis for the GAAT can also provide a feedback loop into curriculum development, providing an understanding of both a graduates' attribute behaviour, and also graduates real life experiences in demonstrating this behaviour in their work practice.

The results, specifically considering respondents' attitudes and actual behaviour (Table 7), indicate that the graduates have developed the five sub-behaviours of the EAR GA. While these results are of a single case study they provide some indications of the relationship between a teaching program and its graduates' behaviours. Yet there are opportunities for the GAAT to be applied to the graduates of a wide range of disciplines where sustainability outcomes are at least part of the educational program. On the basis of the research described, however, we see that in terms of specific social norms the client, market/end user and colleagues/peers have the greatest influence over a graduate's behaviour. The influence that these external factors have presents a challenge for the education program, in particular how to design curriculum content and pedagogy to develop the relevant capability in students; so that as graduates they would be able to recognise these pressures and find strategies to manage them. There appears to be little work in this area of curriculum, hence targeted research will be needed to assist any review process.

The position is similar regarding the graduates' influence/leadership in their workplaces. While the research indicates that the graduates' skills and knowledge, the resources available to them, along with their position description/ability all give them influence in their work-places, the opportunity for graduates to influence work-place decision-making is still limited. Again, in the context of educational programs curriculum guidance related to influencing a workplace appears scarce, hence specific research will be needed to assist any curriculum review.

As a final observation, the research to date has focused on the graduate attribute related to sustainability. Yet the TPB approach appears to be a robust base for assessing a range of graduate attributes. Hence subsequent research to trial the GAAT approach with the assessment of other graduate attributes (e.g.communications) is a logical step.

Limitations and qualifications

It is beyond the scope of this paper to report on how students develop the EAR GA through their program courses/subjects[4] at RMIT. It could be argued that the tool is not effective in determining how, and if, the programs develop an attribute, and that the respondents were self-

selecting. Further rollout of the tool can also capture a larger sample of graduates, however as the survey is voluntary, graduates will always be self-selecting.

The tool links the survey responses to respondents perceived sources of knowledge/skills to answer the questions, asking graduates to select their source/s of knowledge to complete the survey, with options including specific courses, peer groups, friends and family, news and media and so on. Furthermore, Australian universities are required by the Federal Government to audit their programs and provide evidence that the graduate attributes are being developed in their courses. Based on this, it is assumed that graduates do leave RMIT with exposure to the graduate attributes, as these form the basis for curriculum design across all programs. Another critique could be the focus on application in workplace contexts. A key value of the GAAT is the ability to collect data not only on if graduates have the behavioural intention to apply an attribute, but also how this intention is then constrained by social norms and external behavioural controls in real-world work places. This combination of factors (intentions, social norms and behavioural controls) is what is particularly valuable for feeding back into curriculum design to better equip graduates for real work place environments thus supporting employability, and in the case of the EAR GA, with the capabilities to apply sustainability in their real work practices, and ideally, to be more effective change agents.

Conclusion

This project applied the Theory of Planned Behaviour to the assessment of graduate attributes, in this case RMIT's Environmentally Aware and Responsible Graduate Attribute. The value of the tool is that it moves beyond self-assessment, to measure context of a behaviour, and the intention of a graduate to apply the attribute within the work-place context. The tool has also measured graduate intention if free to make their own decisions, to allow insight into the level of uptake of the EAR GA. In this context the project has contributed to the theory associated with assessment of educational outcomes by demonstrating the relevance of TPB to tertiary institutions and their graduates. While TPB, and the GAAT developed through this research may not satisfy the demands of theoreticians, they provide an effective and efficient way of assisting universities, and their academics, to assess learning outcomes and to provide input to curriculum review.

The specific findings based upon the application of this GAAT to EAR (or sustainability) graduate attributes indicate that the graduates surveyed and interviewed have developed the five sub-behaviours of the EAR GA. Specifically, the graduates in this research would seek to behave in a way that is consistent with these elements; although they currently feel constrained by some opposing workplace influences. Broadly, it is clear that their courses in education for sustainability have been effective, for the graduate group tested, in establishing both the knowledge of sustainability and the will to act on these principles in their workplaces.

Notes

1. Australian University Quality Agency (AUQA) has been replaced by TEQSA.
2. An overview of discussion of the thinking about sustainability in relation to the outcomes of tertiary education, i.e. skills, competencies and the like has been presented in Wiek et al. (2011).
3. Means and their Standard Deviations have been computed for the responses, where: 'Always' was coded as 1; 'Most of the time' coded 2; 'About half the time' coded 3; 'Sometimes' coded 4; 'Never' coded 5.
4. See Holdsworth and Sandri (2014) for more detail about one of the dedicated sustainability compulsory core courses that Property, Construction and Project Management undergraduates undertake.

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