



Embedded: The Contribution of a Facilitated Action Research Curriculum Change Project to Sustainability Learning in an Australian University Context

A thesis submitted in fulfilment of the requirements for the degree of
Doctor of Philosophy (PhD)

Fiona Wahr

Master of Education (Educational Leadership and Management), RMIT University

Diploma of Education, La Trobe University

Bachelor of Science, La Trobe University

School of Education

College of Design and Social Context

RMIT University

January 2015

Declaration

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis/project is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged; and, ethics procedures and guidelines have been followed.

Fiona Wahr

22 January 2015

Acknowledgements

First and most importantly, I wish to acknowledge and thank the highly professional and dedicated academics from the Bachelor of Arts (Textile Design) in the School of Fashion and Textiles at RMIT University, who participated in this study and shared the learning journey with me. Their unstinting generosity of time, commitment and energy to the project over many years has led to many successful outcomes arising from the project. Their continued faith in me and the process through both challenging as well as lighter times means new and important insights are able to be shared with others seeking to engage in the essential work of sustainability-related curriculum change. Most significantly, I wish to thank them for their trust in me by sharing their ideas and materials in this study and for inviting me into their classrooms, studios and office, so I was able to gain a deeper appreciation of the work occurring there. I value the warmth and friendship extended to me by the group, which made my time at the Brunswick campus of RMIT University always something I looked forward to, and fun. These affirming experiences have sustained me during the writing-up stage of the study, as I reflected on the process, recalling the many rich and fruitful discussions and collaborations we shared.

My thanks also to the students of the Bachelor of Arts (Textile Design) who agreed to participate in the study by completing surveys, allowing me to evaluate their work, and giving me access to their classes. The project was a time of experimentation within the curriculum, yet the students were very supportive of the goals of the project and tolerant of the interruptions it caused.

My sincere thanks to Mr Keith Cowlshaw, former Head of the School of Fashion and Textiles, without whose enthusiasm, vision and commitment to sustainability learning, as well as his faith in me, this study and its contributions to sustainability learning, would not have been realised.

I have been very privileged to work with an amazing group of supervisors. My deepest gratitude to Professor Barbara de la Harpe, Professor John Fien, Dr Robyn Barnacle and Associate Professor Geoff Shacklock, each of whom has provided expert and astute research guidance and training along with superlative and good-humoured collegial encouragement.

My greatest thanks to Barbara for her ongoing belief in the work, for sharing her enthusiasm, and for her inspiring commitment to learner-centred academic development. Barbara worked many long hours at the hard coalface of the study with me. She co-evaluated the student work with me and provided learning and teaching consulting expertise to group members during the study. Barbara also taught me to write academically, no small task. It was Barbara's passion for the work that has guided me to achieve the research rigour and theoretical depth that validate this study.

My thanks to John, who got me started on the path and inspired me with his vision for the purpose and possibilities of the work.

To Robyn, my thanks for guiding me through this bumpy last year. Robyn worked so diligently and patiently, with great kindness, to help me turn the rough stones of ideas and drafts I presented her with, to this far more coherent and insightful polished gem.

Geoff has always been happy to discuss and encourage my research ideas. In this last year, he kindly agreed to take on second supervision, with little warning and much grace. His guidance has been a reassuring contribution to Team Fiona. My thanks, Geoff.

Many thanks to Professor Matthias Barth who advised me on approaches to analysing the student survey data and undertook second coding of that data. Matthias also provided wisdom on and insight into the world of education for sustainability, and advocated for my involvement in a number of associated research and professional learning opportunities.

Many colleagues have provided inspiration and sage advice and acted as critical friends on different aspects of the study. In particular, this includes Dr Kathleen Gray, Dr Kylie Budge, Angela Clarke, Jana Timms and Professor Alex Radloff. Thank you all.

I wish to acknowledge the School of Education, RMIT University for supporting my successful Australian Postgraduate Award scholarship, which provided welcome financial support during my study. Many in the School helped smooth the administrative challenges of my candidature. My special thanks to Louise Prentice.

I received assistance from the RMIT University Statistical Consulting Service to statistically analyse the quantitative data in this study.

Ms Roberta Blake edited this thesis, complying with RMIT University's Guidelines for editing research theses.

My whole family have been incredibly supportive of my study and especially tolerant of my reduced capacity to be mother, partner, sister and daughter at different times. Without knowing what living with a PhD candidate involved, my family has responded to all of the challenges as these arose with love, understanding and good humour. Thank you Julian Pocock, for being my rock. Fynn, Eadie and Louka Pocock you provided the sparkles that got me through. Thank you, Dr Elizabeth Farrell (big Liz), for your belief in and nurturing of my potential throughout my life. This thesis is dedicated to my family.

To my all my friends, thank you for your continued love, assurances, encouragement and support over the years; especially to Therese Ryan and Melinda Tuckfield, who bore the brunt of the heavy listening.

Thank you to Joanna Bock, Steve Carthew and Christos Tsolkas for providing me with spaces to work in productive solitude at different times over the years.

Finally, a huge thank you to my dear friend, Dr Erika Martens, who has been a pivotal and stoic sounding board and mentor for all aspects of my life over the course of the study. This has included my personal, professional and research lives, and the places where these intersect. In the past year, Erika has coached, cajoled, listened, advised, advocated, and picked up the pieces in so many ways; she has been ready to help in any way, at a moment's notice. My deepest appreciation, Erika.

Table of Contents

Declaration	ii
Acknowledgements	iii
Table of Contents	vi
List of Figures	xi
List of Tables	xii
Summary	1
Chapter 1: Introduction to and Overview of the Study	3
1.1 Introduction.....	3
1.1.1 Introducing sustainability.....	5
1.2 Context and Rationale.....	6
1.2.1 The contribution and progress of higher education for sustainable development.....	6
1.2.2. The program context for sustainability curriculum change.....	11
1.2.3 The research gap this study addresses.....	15
1.3 Aims and Research Questions.....	20
1.3.1 Research aims and objectives.....	20
1.3.2 Research questions.....	20
1.4 Research Design.....	21
1.4.1 Action research.....	21
1.4.2 Pre-step: Background and context.....	22
1.4.3 Action research cycles 1, 2 and 3.....	23
1.5 Framing the Study.....	24
1.6 The Research Context.....	25
1.6.1 The RMIT curriculum and sustainability.....	25
1.6.2 The textile design discipline.....	28
1.6.3 The program.....	28
1.7 Organisation of the Thesis.....	29
1.8 Chapter Conclusions.....	30
Chapter 2: Achieving Sustainability Curriculum Change: What We Know About the Sustainability Curriculum, Issues Impacting Implementation and Ways to Support It	31
2.1 Introduction.....	31
2.2 Education for Sustainable Development and Education for Sustainability.....	32

2.2.1 Sustainability learning outcomes	35
2.2.2 Teaching sustainability learning	39
2.2.3 The sustainability curriculum.....	43
2.2.4 Barriers and obstacles to change	46
2.3 Academic Development	51
2.3.1 Perspectives on academic development	52
2.3.2 Academic development to support sustainability curriculum change	56
2.4 Chapter Conclusions.....	68
Chapter 3: Research Design	70
3.1 Introduction and Overview of Chapter	70
3.2 A Methodology Reflecting Embeddedness	70
3.2.1 The embedded model	70
3.2.2 Introducing action research.....	76
3.3 The Principles and Practices of Action Research Used in This Study.....	77
3.3.1 Action research addresses real, particular and complex issues	78
3.3.2 Action research is critical.....	80
3.3.3 Action research is emergent.....	82
3.3.4 Action research involves learning	88
3.3.5 Action research is participatory	90
3.3.6 Action research is supported by external facilitation	92
3.3.7 Action research emphasises the role of values in research practice	95
3.4 Data Collection and Analysis Methods	97
3.4.1 Interviews and group discussion	100
3.4.2 Surveys.....	101
3.4.3 Teaching observations	107
3.4.4 Artefacts.....	108
3.4.7 Evaluating student work.....	110
3.5 Evaluating the Study.....	112
3.5.1 Evaluating action research	112
3.5.2 Evaluating the professional learning	113
3.6 Chapter Conclusions.....	116
Chapter 4: The Pre-Step: Understanding the Context; Meeting the Group, Starting to Build Collaborative Relationships and Identifying the Need for Change.....	118
4.1 The Pre-Step.....	118
4.2 Meeting the People.....	119
4.2.1 Head of School.....	119

4.2.2 The project group	120
4.3 Need for the Project.....	121
4.3.1 Industry influences	121
4.3.2 Student considerations	123
4.3.3. Personal perspectives	124
4.3.4 The school and university influence	124
4.4 Understandings of Sustainability Within the Group.....	126
4.5 Learning and Teaching Approaches	133
4.6 The Textile Design Program.....	135
4.7 Proposed Changes	144
4.7.1 Empowerment for change	145
4.8 The SWOT Analysis.....	147
4.9 Pre-Step Summary.....	150
Chapter 5: Findings – Three Cycles of Action Research Progressing the Curriculum Change and Project Evaluation.....	151
5.1 Introduction	151
5.1.1 The cycles overall	151
5.2 Cycle 1 – Developing Sustainability-Related Intended Learning Outcomes.....	153
5.2.1 Constructing: Thinking about sustainability in the textile design curriculum.....	154
5.2.2 Planning action: What do we need to do to develop the ILOs	158
5.2.3 Taking action: Developing the ILOs.....	160
5.2.4 Evaluating action: Evaluating the ILOs	163
5.2.5 Complementary activities contributing to Cycle 1	165
5.3 Cycle 2: Teaching the Changed Curriculum	169
5.3.1 Constructing: Reflection on Cycle 1 and reframing.....	169
5.3.2. Planning action: Developing the learning and teaching details of the new courses.....	172
5.3.3 Taking action: Teaching the changed courses.....	172
5.3.4 Evaluating action: Evaluating the learning and teaching of the new courses.....	172
5.3.5 Complementary activities contributing to Cycle 2.....	179
5.4 Cycle 3: Enhancing assessment practices.....	181
5.4.1 Constructing: Review understandings of purpose and practice of assessment.....	182
5.4.2 Planning action: Researching assessment design.....	184
5.4.3 Taking action: Developing and applying new assessment approaches	186
5.4.4 Evaluating action: Reflecting on new assessment approaches.....	186
5.4.5 Complementary activities contributing to Cycle 3.....	189
5.5 Reflections on the Cyclical Process.....	191

5.6 Evaluating the Project.....	192
5.6.1 Reactions.....	193
5.6.2 Learning.....	194
5.6.3 Behaviour.....	196
5.6.4 Results.....	197
5.6.5 Internal validation.....	203
5.7 Chapter Conclusions.....	204
Chapter 6: Discussion	206
6.1 Introduction	206
6.2 Relating the Project Success to the Embedded Model	206
6.2.1 Key success factor 1: Normalisation of critical reflection	207
6.2.2 Key success factor 2: Development of a common language within the group.....	213
6.2.3 Key success factor 3: Maintaining group cohesion in relation to the project.....	219
6.2.4 Key success factor 4: Responsive facilitation	226
6.3 Success Factors Not Attributed to the Embedded Model	232
6.4 Chapter Conclusions.....	234
Chapter 7: Conclusions.....	236
7.1 Introduction	236
7.2 The Embedded Model	236
7.3 Challenges Associated With the Study.....	238
7.4 Transferability of the Embedded Model.....	240
7.5 Reflections on Facilitation.....	240
7.6 Recommendations for Further Research	242
7.7 Recommendations for Progressing Sustainability Learning in Higher Education Institutions	242
7.8 Chapter Conclusions.....	243
References	244
Appendix A – Initial interviews of academics - interview schedule	261
Appendix B – Initial interviews of academics – codes identified from transcripts.....	262
Appendix C – Survey of Academics 1 – survey instrument and results	264
Appendix D - Survey of Academics 2 – survey instrument and results.....	269
Appendix E – Student survey – summary of results for Question 6	275

Appendix F – Student survey – summary of results for Question 7.....	284
Appendix G – Teaching Observations – example of notes from post observation discussion with academic (semester 1).....	304
Appendix H – Sample of written course curriculum - pre and post curriculum change	307
Appendix I– Evaluation of student work – summary of evaluation results	312
Appendix J – Collaboratively written paper – (Wahr & Underwood, 2010)	314
Appendix K - Collaboratively written paper – (Underwood et al., 2011).....	315
Appendix L – Reviewing teaching trials – sample of facilitator’s notes from discussion with academic	316
Appendix M – Teaching Observations – example of notes from post observation discussion with academic (semester 2).....	320
Appendix N – Informal discussion with academics - example regarding assessment	323
Appendix O– Collaboratively written paper – (Wahr et al., 2013)	325

List of Figures

Figure 1.1: Timing of Action Research Cycles.	22
Figure 3.1: Representation of the study.	77
Figure 3.2: An action research cycle.	84
Figure 3.3: Focus of action research cycles used in the project.	87
Figure 3.4: An action research cycle indicating the learning process associated with each step of the cycle.	89
Figure 4.1: Advantages supporting sustainability related curriculum change.	148
Figure 4.2 Limitations restraining sustainability related curriculum change.	148
Figure 4.3 Challenges to undertaking sustainability related curriculum change.	149
Figure 4.4 Possibilities for undertaking sustainability related curriculum change.	149
Figure 5.1: Representation of the key activities of the curriculum change project.	152
Figure 5.2: Stages of Cycle 1.	154
Figure 5.3: Project goals agreed by group in Workshop 1.	155
Figure 5.4: Group’s sustainability ideas reorganised.	157
Figure 5.5: Textile Design graduate sustainability-related sub-attributes (Head, Heart and Hands).	159
Figure 5.6: Sustainability intended learning outcomes for Textile Studio courses.	162
Figure 5.7: Sustainability learning map for Textile Studio 2B – car company project.	162
Figure 5.8: Sustainability learning map for Textile Studio 2B – textile company project.	163
Figure 5.10: Stages of Cycle 2.	169
Figure 5.11: Stages of Cycle 2 including complementary activities.	180
Figure 5.12: Stages of Cycle 3.	182
Figure 5.13: List of concerns regarding assessment, presented in Workshop 5.	183
Figure 5.14: Reflective questions, discussed in Workshop 5.	184
Figure 5.15: Key questions regarding assessment, discussed in Workshop 5.	184
Figure 5.16: Representation of one group member’s experience of the project.	188
Figure 5.17: Stages of Cycle 3 including complementary activities.	189
Figure 5.18: Illustration depicting the meaning making process arising from the project.	204
Figure 6.1: Limitations and challenges identified in the SWOT analysis.	209
Figure 6.2: Photo of group’s shared ideas about sustainability.	215
Figure 6.3: One academic’s reflection on embedding sustainability into their course.	217
Figure 6.4: Representation of the relationship between discourse development and sustainability related curriculum change.	218
Figure 6.5: Subcycle of Cycle 1, intervention to support ILO development	221
Figure 6.6: Learning outcomes selected for courses in preparation for mapping.	224
Figure 6.7: Pre-project advantages supporting sustainability related curriculum change.	233

List of Tables

Table 2.1: Strategies for Integrating Sustainability into the Higher Education Curriculum.....	44
Table 2.2: Academics' Conceptions of Graduate Attributes and Associated Teaching Approach.....	49
Table 4.1: Summary of the Aspects Included in Academics' Understandings of Sustainability.....	132
Table 4.2: Bachelor of Arts (Textile Design) 2008 Program Structure Including Sustainability Learning...	136
Table 5.1: Sustainability Intended Learning Outcomes Developed for the Course.....	161

Sustainability-related curriculum change in higher education has been slow to progress despite high level calls for change. The lack of appropriate professional learning for academics is seen as a significant factor hampering curriculum change.

This study identified, implemented and evaluated a professional learning model, the embedded model, to explore its contribution to supporting academics to bring about lasting and transformative sustainability-related curriculum change. The embedded model was informed by both sustainability learning and academic development literature. The model is characterised by a set of elements which are holistic, integrative and transformative. The model combines provision of facilitated professional learning within the context of whole-of-program curriculum change.

The study used an action research methodology where a professional learning/curriculum change project using the embedded model was conducted over 3 plus years with the academics who teach into the Bachelor of Arts (Textile Design) at RMIT University, Melbourne, Australia. The study, therefore, considered the implementation of the embedded model in one program and disciplinary context. The study found sustainability was embedded in the curriculum, students had engaged in and achieved sustainability learning, and transformative change was identified amongst academics.

The evaluated project showed successful outcomes on a range of measures, including achieving internal validity among participants. Academics developed changed understandings of their discipline and curriculum, such that these now incorporated sustainability, as well as changed learning and teaching practice. Moreover, academics developed their capacity for self-directed reflective practice and practice enhancement in relation to learning and teaching most likely as a result of their involvement in the project.

The key factors supporting successful and transformative curriculum change were identified. They include:

- Normalisation of critical reflection amongst the group of participants;
- Development of a common language amongst the group which includes learning and teaching, sustainability and discipline (textile design) literacies;
- Maintaining group motivation throughout the project by developing and strengthening mutually respectful collaborative relationships;
- Responsive facilitation which is able to support and foster the development and maintenance of the above key success factors;
- These success factors reflected the professional learning approach provided by the embedded model. Transferability of the embedded model to other contexts has not been attempted; however, this study suggests the model offers great possibility for supporting transformative sustainability related curriculum change in other higher education settings.

This study demonstrates deeply embedded, transformative sustainability curriculum change is achievable within higher education program contexts.

Chapter 1: Introduction to and Overview of the Study

1.1 Introduction

This research study explores the practice of sustainability-related curriculum change in higher education. There have been long-standing calls for sustainability learning to be understood, valued and included among the knowledge, skills and attitudes of graduating students so they can contribute to making the world more sustainable environmentally, socially and economically (Thomas & Nicita, 2002). Universities have a core role in leading the changes to mainstream sustainability learning (Corcoran, Calder, & Clugston, 2002). In practice, however, we have not seen this achieved around the world beyond ad hoc responses (Leal Filho, 2011a). Reasons attributed to this slow pace of change, and indeed the suggested strategies to increase the pace of change within universities are multiple and interrelated (Barth, 2013; de la Harpe & Thomas, 2009).

Appropriate support for academics, including their professional learning, to bring about curriculum change within the courses and programs¹ they teach is recognised as one of the key drivers towards graduates' sustainability learning (Barth & Rieckmann, 2012; de la Harpe & Thomas, 2009; Holdsworth, Wyborn, Bekessy, & Thomas, 2008; Wals & Blewitt, 2012). Research that seeks to explore appropriate forms of support, however, highlights the difficulties of achieving the necessary curriculum change which employs the "... widespread use of the holistic, interdisciplinary, transformative learning approaches advocated by theorists" (Cotton, Bailey, Warren, & Bissell, 2009, p. 719). This suggests a need for renewed approaches, which I believe can be enhanced with the inclusion of closer consideration of what the field of academic development can offer.

Broadly speaking, academic development is the support for and facilitation of change initiatives associated with learning and teaching practice, including changes to the curriculum (Blackmore et al., 2004), or as Rowland (2003, p. 13) puts it "[a]cademic development is ... the development of academic practice". As a discipline, academic development draws variously on a number of fields, including adult learning pedagogy and instructional design, as well as organisational development and change to inform strategies for working with academics.

¹ A program refers to a program of study resulting in an academic qualification. Courses refer to the units of learning making up the program.

As an academic developer, for over 18 years, I have worked with teams of academics to support them to change their curricula. I was first exposed to the inclusion of sustainability learning through my work in assisting the embedding of RMIT University's graduate attributes into the higher education curriculum. RMIT University (RMIT) is based in Melbourne, Australia. At the local level, I struggled with what I saw as a contradiction between RMIT's expectation of sustainability learning and a lack of appropriately designed curricula to promote sustainability learning among students. Hence, this study arises from my experience as an academic developer, where I have used an approach informed by academic development principles and practice, as well as sustainability learning theory and practice to explore and contribute to the knowledge base and achievement of sustainability related curriculum change. The study is located at close quarters within the actual practice of curriculum change, to better understand how to progress what is a unique and complex amalgam of contextual factors and issues impacting change and, in particular, the role of the academic developer facilitator.

The study comprises a single curriculum change project aimed at embedding sustainability into a higher education degree program in Australia using an embedded professional learning model. Embedded here means fixed firmly and deeply as an integral part of a system; that is, built-in rather than bolted-on (Baker & Henson, 2010). It involves "... the engagement of the innovation in the local processes and perhaps the modification of policies, procedures and structures to accommodate the new practice" (Southwell, Gannaway, Orrell, Chalmers, & Abraham, 2005, p. 20). I was both the researcher of the study and academic development facilitator of the curriculum change project (the project). The study used an action research approach (Coghlan & Brannick, 2010; Kemmis & McTaggart, 2008; Townsend, 2013), where I worked with a group of academics as both facilitator and action researcher over 3 years to embed sustainability learning into their higher education degree program. This thesis reports the findings and learnings from this curriculum change project.

This chapter locates sustainability and sustainability learning in Australian higher education as it relates to this study. It starts with a brief overview of the context and rationale for the study and includes the background to sustainability learning in higher education and progress thus far, leading to the explication of the research gaps that this study seeks to address. This is followed by the specific aims and objectives of the study, including the research questions that are presented and discussed in relation to the

theoretical framework and the “embedded” practice model used in the study. The selection of action research as the study methodology and how this was enacted is then outlined. The scope of the research section then describes the main steps of the research process. The specific research context in which the study was undertaken is described. The chapter concludes by explaining the organisation of the thesis.

1.1.1 Introducing sustainability

Human practices are known to have caused and continue to cause significant, long-standing and, in many cases, irreversible environmental and ecological degradation (Millennium Ecosystem Assessment Board, 2005). Concern for, awareness of, and calls for action to address the causes, effects and implications of worldwide environmental degradation have grown significantly in the past 20 years (Intergovernmental Panel on Climate Change, 2014). These actions have been spearheaded by the United Nations (UN) Conference on Environment & Development in Rio de Janeiro, Brazil, in 1992 resulting in the publication of Agenda 21 (United Nations, 1992), which has guided and continues to underpin subsequent international and local efforts and agreements to promote sustainable development primarily through the UN agency, the United Nations Educational, Scientific and Cultural Organization (UNESCO) (United Nations, n.d.). The call for sustainable development comes from increasing awareness of the impacts of unsustainable practices. There are a myriad of interpretations and definitions of sustainable development (Vare & Scott, 2007). The terms “sustainability” and “sustainable development” are often conflated or used interchangeably and variously defined (Vare & Scott, 2007). Academics understand the term “sustainability” in different ways (Reid & Petocz, 2006), as do students (Pearson, Honeywood, & O’Toole, 2005). In my work as an academic developer, I have found committing to a specific definition unhelpful for a number of reasons. First, understandings of sustainability are ideally dialogical, contextually framed and evolving (UNESCO, n.d.-a; Wals, 2010a). Second, I have not wished to limit such discussions by imposing or privileging my personal perspective and values relating to sustainability. And third, I have wished to remain open to changing my own understandings over the duration of the study.

As a starting point of such discussions, however, it is useful to refer to some generally and inclusive definition to focus the discussion. The World Commission on Environment and Development (WCED) coined what is often referred to as the Brundtland definition, the most enduring and frequently used definition for sustainable development thus far:

“development ... that ... meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987, p. 24), which has evolved to UNESCO’s present definition

... sustainable development seeks to meet the needs of the present without compromising those of future generations. Sustainable development is a vision of development that encompasses respect for all life – human and non-human – and natural resources, as well as integrating concerns such as poverty reduction, gender equality, human rights, education for all, health, human security and intercultural dialogue. (UNESCO, n.d.-b).

A useful conceptualisation of sustainable development is as a system encompassing environmental, social and economic considerations and impacts. These three dimensions (or pillars) form an interrelated system, which when accounted for concurrently, promote the development of responses more likely to support sustainable development (Randers, 2000; United Nations Department of Economic and Social Affairs, 2009). The co-dependence between the dimensions means that improvement efforts in any one dimension, in a given context, require consideration of its relationships with and impacts on the other dimensions to ascertain if such effort will contribute to sustainability.

UNESCO use the term “education for sustainable development” (ESD) to describe learning that promotes sustainable development; however, a number of alternative terms are used across the literature to similar ends. Chapter 2 discusses the diversity of understandings of sustainability, sustainable development and learning associated with these. For this introductory chapter, except where the term “ESD” explicitly applies, I refer to “sustainability learning” as learning that broadly promotes achievement of the above UNESCO definition.

1.2 Context and Rationale

1.2.1 The contribution and progress of higher education for sustainable development

Social change for sustainability is difficult (Cairns, 2005; Randers, 2000). Education is widely held to be a key approach to support the social changes required for sustainable development: “Education ... is a key instrument for bringing about the changes in the knowledge, values, behaviours and lifestyles required to achieve sustainability and stability within and among countries, democracy, human security and peace” (UNESCO, n.d., p. 1); and is seen as crucial for the achievement of Agenda 21 (United Nations, 1992, Chapter

36). Indeed, 2014 marks the end of the United Nation's Decade of Education for Sustainable Development (DESD), where the UN has systematically aimed to "... emphasize the critical role of education in moving towards a more sustainable world" (Wals, 2014, p. 8).

Higher education contributes to sustainability through four core activities: (1) research relating to sustainability matters; (2) sustainability-oriented change within institutions themselves (i.e., "greening the campus"); (3) learning and teaching activities that aim to prepare graduates to practise more sustainably (Barth, 2013; Stephens, Hernandez, Román, Graham, & Scholz, 2008); and (4) engagement with the community (Moore, 2005; Wals & Blewitt, 2012). In relation to learning and teaching, universities educate the next generation of decision makers in society. Higher education can influence the ability of these professionals to support sustainable development when graduates take what they learn in their university studies and apply this through their professional practice (Tilbury, Keogh, Leighton, & Kent, 2005; University Leaders for a Sustainable Future, 2008).

The incorporation of sustainability into higher education has been promoted and supported by international declarations calling on universities to take action for environmental, social and economic sustainable development. These UNESCO sponsored efforts have encouraged universities to promote sustainable development through a number of international leadership efforts aimed at guiding, motivating and engaging universities in sustainable development, with the first being the Talloires Declaration in 1990 (Lozano, Lukman, Lozano, Huisinigh, & Lambrechts, 2013; Wright, 2004), since followed by others, including the Copernicus Declaration in 1994, the Lüneburg Declaration in 2001, the Declaration of Barcelona in 2004, the Graz Declaration in 2005, and the Abuja Declaration in 2009 (Lozano, et al., 2013). While the declarations differ in application, all emphasise that "... universities have a moral obligation to work towards sustainable societies, focussing on environmental degradation, threats to society, and sustainable production and consumption for this and future generations" (Lozano, et al., 2013, p. 17). The objectives of such declarations are broad and call on universities to work holistically towards the following goals:

- i. to maintain a moral obligation to sustainable development
- ii. to provide public outreach on sustainable development
- iii. to maintain sustainable physical operations
- iv. to teach for ecological literacy

- v. to develop interdisciplinary curriculum
- vi. to encourage sustainable research
- vii. to develop partnerships with governments, non-government organisations and industry and participate in interuniversity cooperation.

(Wright, 2004, p. 13)

In Australia, a number of universities state sustainability learning as a priority for their students; however, embedding sustainability learning into the curriculum has been slow to eventuate (Lang, Thomas, & Wilson, 2006; Sherren, 2006). A shift to action has been called for in Australia, although this has not been attached to a mandated requirement from the Australian government. The Australian government's first response to international calls in support of sustainability learning was to develop the Environmental Education for a Sustainable Future: National Action Plan (NAP) (Environment Australia, 2000) for all education sectors, including higher education. Similar to the goals of the UN, the NAP sought "... in its broadest sense to encompass raising awareness, acquiring new perspectives, values, knowledge and skills, and formal and informal processes leading to changed behaviour in support of an ecologically sustainable environment" (p. 5). The Australian government subsequently sponsored the establishment of the Australian Research Institute in Education for Sustainability (ARIES) at Macquarie University to research and foster the development of sustainability learning in Australia.

In 2006, a review of the progress of the NAP recommended, without being critical of existing practice or government policy, a shift away from "awareness raising and changed behaviours" (Tilbury & Cooke, 2005, p. 3) to learning for understanding and change for sustainability. The review called for Australian universities, based on international benchmarking, to take a systematic approach to sustainability learning rather than the localised, isolated efforts observed to date. The peak body for universities in Australia, the Australian Vice Chancellors' Committee (AVCC), responded to the NAP in 2006 by releasing a one-page policy on sustainability learning for the university sector. The policy states "a commitment to Education for Sustainable Development" by providing a leadership role, where "[b]y 2020, the university sector in Australia will be playing a key role in promoting sustainability in the community through research and building capacity to achieve change for sustainability" (AVCC, 2006, p. 1). However, its guidance to universities is broad, with no specific direction to achieve the aims of the policy.

In 2010, the Australian government developed a revised NAP to respond to the United Nations' DESD, called "Living Sustainably: the Australian Government's National Action Plan for Education for Sustainability" (2010). This document builds on the first NAP with a strengthened vision that "[a]ll Australians have the awareness, knowledge, skills, values and motivation to live sustainably" (p. 17), with a specific objective, among others, that "[e]ducation for sustainability is integrated into all university courses/subject areas" (p. 21); that is, to mainstream sustainability teaching and learning into programs whose disciplines are not traditionally associated with sustainability. To achieve this, the revised NAP refers to the establishment of dedicated structures to support its vision and objectives and refers to strategies which "support and encourage" universities to change; still, however, without introducing mandated requirements (Department of the Environment, 2009, p. 23). At the same time, Universities Australia (formerly the AVCC), were reported to have responded to the government's revised direction, having "raised [sustainability learning] on their agenda so 'Australians can move beyond environmental awareness to informed action'" (Universities Australia [2011], as quoted in Littleddyke, Manolas, & Littleddyke, 2013, p. 373). However, at the time of writing (June 2014) the cited document from the Universities Australia website could not be found, nor any other reference to their position on sustainability learning. In Australia, therefore, leadership for sustainability learning within each university depends largely on the commitment and action of the individual university itself.

Whole-of-university approaches, where sustainability is included in all four core activities, are seen to best support a university's sustainability efforts overall, as the activities mutually promote each other (Department of the Environment, 2009; McMillin & Dyball, 2009; Moore, 2005; Woollorton, Palmer, & Steele, 2011). For example, sustainability learning is made up of both students' formal and informal learning experiences and campus-based experiences offered by the university (Hopkinson, Hughes, & Layer, 2008; McMillin & Dyball, 2009). In 2002, in their editorial for the Higher Education Policy special edition focussing on ESD in higher education, Corcoran et al. observed:

[m]any higher education institutions have responded to this major challenge of our time by making sustainability central to the critical dimensions of university life – curriculum, research and scholarship, operations, community outreach and service, student opportunities, institutional mission and structure, and faculty and staff development and rewards. (Corcoran et al., 2002, p. 99).

To date, however, few universities have attempted such all-encompassing sustainability focus and change (Barth, 2013; Filho, 2011a). Ferrer-Balas et al. (2008, p. 298) conclude that “[w]hile there are undoubtedly some universities that are already on their way to embodying some of these ideals [of a sustainable institution], achieving change at the majority of universities around the world will require tremendous effort”. Voluntarily signing the international declarations discussed above has not led universities to prioritise mainstreaming sustainability in higher education. Over 600 universities worldwide have signed up to one or more of the above declarations and “despite the fact that several thousand of them are pursuing matters related to sustainable development on an ad hoc basis, many of them have not succeeded in fully implementing the principles of sustainable development into practice” (Filho, 2011a, p. 430). Some examples stand out, such as the University of Gloucestershire, where ESD has been organisationally supported across the curriculum (Roberts & Roberts, 2007); however, such examples are a small minority. At the close of the DESD, mainstreaming of a sustainability-related curriculum in higher education is not assured.

There are a range of reasons why universities have not implemented sustainability as a whole-of-university approach, including ineffectual organisational responses (Lang et al., 2006) as well as conflicting philosophical grounds (Scott & Gough, 2006). In particular, initiatives involving embedding sustainability learning require university strategic leadership for success (Lang et al., 2006). Wright’s (2009b) study of leaders’ attitudes within 17 of the 29 Canadian signatory universities to the Talloires Declaration suggests that despite its perceived worth, sustainability in higher education is not seen as a priority for universities. Wright found that while each agreed “the university had a role to play in achieving a sustainable future”, only one included it within the key issues facing their university within the next 10 years (p. 66). Wright’s research supports Filho’s position where “[u]niversity blueprints (or strategies), declarations or action plans are useless, unless they can be backed up by concrete action” (Filho, 2011a, pp. 429–430).

Hence, within university leadership and government policy settings generally, it can be said that a clear vision for harnessing the opportunity of sustainability learning in higher education has not been articulated (Filho, 2011a). Pro-sustainability structural change within universities is, thus, ideally needed to back up strategic statements about the need for sustainability approaches (Franz-Balsen & Heinrichs, 2007; Holdsworth, Bekessy, & Thomas, 2009). In Australia, there has been some progress, with a number of Australian

universities promoting sustainability credentials (see, e.g., James Cook University, 2014). Where universities have sustainability goals included in vision, mission, and graduate attribute statements, consistent with Wright's (2009b) observations in Canada, these are not reliably reflected in practice (Lee, Barker, & Mouasher, 2013). Australia's position is considered a "nascent movement" relying on individual universities to decide to commit to change (Wooltorton et al., 2011, p. 161).

Despite inconsistency between claims and action at university leadership/management level, at the same time calls from within academia for change and the mainstreaming of sustainability in higher education learning and teaching have gained greater prominence in the last decade. For example, a special edition of the well regarded journal *Higher Education Policy* was dedicated to sustainability in higher education in 2002, with the editorial stating that "[s]ustainable development is the current context in which higher education must focus its mission" (Corcoran et al., 2002, p. 99). However, it is recognised that such calls come from and are largely responded to by those already party to "international sustainable development dialogues" (Ryan & Tilbury, 2013, p. 272). There remains a challenge to fully engage and mainstream sustainability in higher education as core within university business (Ryan & Tilbury, 2013).

1.2.2. The program context for sustainability curriculum change

Notwithstanding the absence of university leadership, bringing about sustainability-related curriculum change is complex (Wals & Jickling, 2002). To bring about the changes in graduate learning needed to address issues of sustainability appropriately, requires substantial change to existing curricula (Sterling, 2004b). The nature of sustainability-related curriculum change requires either "reformation" or "transformation", where reformation refers to the integration of sustainability-related content into the curriculum using "... a critically reflective, adaptive response or second-order change" (Sterling, 2004b, p. 55). Curriculum transformation refers to the redesign of the entire curriculum reflecting a paradigmatic change underpinned by "... new meaning-making and examination of existing assumptions" (Sterling, 2004b, p. 55). Moreover, systemic transformation outcomes require redesign of not only the curriculum in totality (whole-of-program), but also the generative education system. Achieving transformation would, therefore, require broad societal and at least whole-of-university change, which as indicated earlier, is not yet forthcoming and remains elusive in the face of competing demands for reform (Wals, 2014). Despite this, curriculum transformation remains a notion

or possibly a goal to inform and guide change efforts, while more pragmatic changes more akin to reformation are progressed (Wals, 2014).

A 2010 audit of the extent of RMIT's sustainability learning within degree and vocation programs showed that overall sustainability learning is not integrated into the curriculum in a majority of programs (see section 1.6.1, *The RMIT curriculum and sustainability* for more details). Consistent with the RMIT experience, curriculum change for sustainability has been slow to happen in university contexts, with few accounts reported in the literature of the deep and systematic changes needed (Holdsworth, Bekessy, Mnguni, Hayles, & Thomas, 2006; Wals, 2014). As Wals (2014, p. 11) points out: “[d]espite the early signs of a transition in some parts of the academic community, sustainability by and large is still largely external to the student, academic faculty member and administrator within higher education”. A detailed discussion of barriers and challenges to embedding sustainability into higher education curricula at school or program level is found in Chapter 2. Two key drivers may be used to overcome the barriers and challenges. First, by viewing sustainability learning as a graduate attribute, it is possible to utilise existing curriculum change strategies aimed at embedding graduate attributes. Second, by providing appropriate professional learning supports those academics undertaking sustainability-related curriculum change.

Graduate attributes are “... the core outcomes of a higher education ... they specify an aspect of the institution's contribution to society and carry with them implicit and sometimes explicit assumptions as to the purpose and nature of higher education” (Barrie & Prosser, 2004, p. 244). Embedding sustainability learning into the curriculum as part of graduate attributes policy and practice can offer an appropriate strategy of embedding sustainability learning into higher education. Graduate attributes provide an existing curriculum infrastructure. Further, sustainability learning can be shown to be aligned with existing graduate attributes (Sterling & Thomas, 2006; Thomas, Barth, & Day, 2013) or the intent of graduate attributes. All 28 Australian universities are required to develop a locally contextualised set of graduate attributes that are reflected in each undergraduate program offered (Barrie, 2005). In Australia, graduate attributes are seen as fundamental policy drivers for supporting sustainability learning in higher education in Australia (Desha & Hargroves, 2014; Sterling & Thomas, 2006; Thomas, et al., 2013; Thomas, Hegarty, & Holdsworth, 2012). Environmental and sustainability-related graduate attributes have become more prevalent within Australian university curricula since 2005 and sit among the

group of graduate attributes for achieving social good (Bosanquet, Winchester-Seeto, & Rowe, 2010) and social justice and equity (Thomas et al., 2013). A 2008 survey of university websites listing graduate attributes, however, found only four universities specifically referred to environmental and/or sustainability-related graduate attributes (Institute for Teaching & Learning, 2008).

In 2007, when I began this study, RMIT's graduate attributes policy included references to sustainability: "RMIT graduates will be: Work-ready; active learners; life-long learners; global in outlook and competence; culturally and socially aware; innovative; [and,] environmentally aware and responsible" (Barber, 2007, p. 3). RMIT suggests the graduate attribute *environmentally aware and responsible* can be evidenced in the following ways, linking it closely to sustainability more broadly.

- 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 University, n.d.-a)

The inclusion of sustainability-related themes in RMIT's graduate attributes places it within a small minority of Australian universities. As inclusion of sustainability and/or environmental graduate attributes is discretionary among universities, RMIT's graduate attributes suggest a level of organisational commitment to these goals; however, as indicated by the survey referred to earlier, this has not been realised in practice. Nonetheless, the inclusion of sustainability among RMIT's graduate attributes provided existing scope for program teams to bring about sustainability-related curriculum change at the local, program level.

Appropriate professional learning for academics that systemically promotes sustainability curriculum change is also seen as a significant driver to bring about the called for changes (Barth & Rieckmann, 2012; Department of the Environment, 2009; Wals, 2009). Consistent with the shift in emphasis in the current Sustainable Future: National Action Plan (NAP) from awareness to empowerment for action, since as discussed above, awareness raising is not enough as it does not necessarily result in changed practices. Professional learning is shown to be demanding, requiring "... the exploration of disciplinary and institutional assumptions that shape definitions of sustainable

development ... to avoid the development of shallow and simplistic interpretations of sustainability and its place in the curriculum” (Holdsworth et al., 2009, p. 51). Moreover, university leaders and academics increasingly recognise the need for and are becoming more accepting of academic professional development support to undertake curriculum change for sustainability (Holdsworth et al., 2008; Lotz-Sisitka, Lupele, & Ogbuigwe, 2007). The sustainability learning literature calls for dedicated academic development approaches that genuinely foster engagement, as opposed to alienating or disempowering academics from participation, in order to assist sustainability-related curriculum change (Tilbury, 2001). It is recognised that the provision of appropriate professional learning for academics necessitates that support is provided for academics to incorporate sustainability-learning approaches into their curricula and, where necessary, to adapt their teaching and assessment approaches. Yet, models for academic development that have been shown to support sustainability learning are currently not readily available (Holdsworth et al., 2008), nor is it well understood what professional learning academics need to support them to apply sustainability learning approaches and how such learning might best be provided.

Bringing together these two drivers, sustainability as a graduate attribute and the need for professional learning, suggests sustainability curriculum change efforts might benefit from what is already known about the professional learning needs of and support for embedding graduate attributes more generally. In terms of graduate attributes, embedding these across the courses of a program promotes deeper and more enduring learning compared with teaching graduate attributes in individual courses or electives. In this thesis, my approach is underpinned by a belief supported by the literature, that sustainability learning needs to be integrated holistically into programs.

There are many examples in the literature where sustainability has been integrated into courses. These are often driven by individual champions of sustainability and present sustainability as a stand-alone concept. Stand-alone courses are not without sustainability learning benefit (Hegarty, Thomas, Kriewaldt, Holdsworth, & Bekessy, 2011). However, they are less likely to present sustainability as a concept integrated among the other learnings in a student’s program. In relation to sustainability specifically and graduate attributes generally, it is recognised that systemic and whole-of-program approaches to curricula are needed to support the transformative change that is needed to embed sustainability if graduates are to identify sustainability as core to their professional practice (Bath, Smith, Stein, & Swann, 2004; Sterling, 2004b; Sterling & Thomas, 2006). A whole-

of-program approach includes assessing graduate attributes as well (Radloff, de la Harpe, Dalton, Thomas, & Lawson, 2008). A whole-of-program approach, where the responsibility for teaching and learning of sustainability is carried within each course of a program, by all academics teaching into the program, encourages students to view sustainability learning as core to their discipline or profession (Benn & Dunphy, 2009; Sterling & Thomas, 2006). Such an approach is supported when the academics teaching into the program engage in a “contextualised social process” (Bester & de Graaff, 2012, p. 12). However, working across a whole program with multiple and interlinked courses, with many more stakeholders, creates exponentially greater complexity in relation to achieving curriculum change.

The challenges associated with the more ambitious goal of whole-of-program sustainability transformation are acknowledged within the literature (Hegarty et al., 2011). It comes as no surprise, therefore, that whole-of-program cases of sustainability-related curriculum change are largely absent from the literature. Given this, “second-best” solutions, such as stand-alone courses, are seen as, at least, a way to progress sustainability learning and worth pursuing (Cotton et al., 2009, p. 731; Hegarty et al., 2011). While there is much to be learned from course level examples of curriculum change, deeper accounts of more embedded, whole-of-program change are needed, as this study purports to do, as these represent a more comprehensive pedagogical model to support students’ sustainability learning and also promote and demonstrate to others how this can work. In addition, exemplars are required showing that a whole-of-program approach to sustainability curriculum change, where academics work collaboratively, is likely to promote academics’ professional learning in regard to sustainability learning more effectively than working in isolation. Whole-of-program approaches are necessarily complex as they require a coherence of learning across the program and a consistency of pedagogical considerations with more stakeholders involved who must work together to develop and apply a shared understanding of what is included in the sustainability curriculum. The next sections shows how this study responds to the need for whole-of-program approaches to sustainability-related curriculum change which support academics’ professional learning.

1.2.3 The research gap this study addresses

There is an absence of knowledge about and examples of how to bring about effective, whole-of-program and long-lasting curriculum change that impacts positively on students’ capability to practise sustainability in their professional lives. This thesis addresses this gap

by designing, applying and evaluating an academic development approach in the form of a professional learning model (the embedded model), to bring about sustainability-related curriculum change in a university program. This thesis documents the following steps of the study:

1. Identification of an appropriate professional learning model from the academic development literature to bring about sustainability related curriculum change; the embedded model.
2. Application of the embedded model:
 - within the context of curriculum change;
 - in a program/discipline area not traditionally inclusive of sustainability learning;
 - within a typical university context where sustainability learning is espoused but not proactively supported by university leadership and management.
3. Evaluation of the embedded model:
 - including detailed reporting of the process and outcomes, including in-depth student learning evaluation resulting from the curriculum change project;
 - identifying the key success factors for the project, including the role and significance of the academic development facilitator in the professional learning process;
 - and, within this research project, considering the significance of action research as a methodology.

An exploration of the academic development literature offers insight into a number of promising approaches to designing appropriate academic development to engage academics and support sustainability-related curriculum change. Starting with what is known about learning and successful curriculum design change, including what is known about embedding graduate attributes particularly, as well as the characteristics and approaches to sustainability learning, it is possible to unpack the most important aspects an academic development approach might use to support academics to undertake/embark on curriculum change for sustainability. Ideally, the principles of sustainability learning itself – critical thinking, systemic thinking, local interpretations – are applied within the professional learning approach.

Recognising that “there is no panacea for [sustainability] curricula reform” (Wals & Jickling, 2002, p. 288), Chapter 2 reviews the literature on the goals of and approaches to sustainability learning and relates this to academic development literature, finding

alignment among approaches. The notion of “embeddedness” is used to frame the study and as a thread throughout the study, bringing together key ideas from both the sustainability and academic development literature. This project uses the notion of embedded to inform the intent, the process and the aimed for outcomes of the project. Embeddedness is threaded through the project in the following ways:

Embedded model

Intent:

- deep and transformative change for academics;
- long-lasting impact of outcomes and benefits.

Process:

- professional learning approach is based on the need for critical reflection;
- scholarly approach adopted;
- discipline perspective emphasised:
 - whole-of-program focus to curriculum change;
 - all of the program team involved;
 - participants encouraged to approach the work from within their existing discipline/professional lenses;
 - existing sustainability capacity within the program team and program recognised, celebrated and capitalised on rather than applying a deficit model of starting from scratch;
 - engagement with a range of stakeholders within the university and industry and the program/discipline perspective promoted.
- social learning within and beyond the group promoted:
 - group workshops and activities the focus of professional learning;
 - multiple perspectives explored;
 - collaborative problem solving enacted;
 - action orientation applied;
 - reflection on action fostered.
- facilitation of the project provided:
 - facilitation and support provided within the professional practice context of the program team and the local teaching context;
 - facilitation is anticipatory of and responsive to professional learning needs of the program team;

- project undertaken over an extended time period;
- curriculum design underpinned by constructive alignment;
- sustainability learning taught, assessed and reviewed.

Outcomes:

- project ownership and engagement in the project among academics established;
- sustainability issues viewed as relevant within local and broader contexts;
- sustainability learning built into and aligned within the curriculum;
- links to other sustainability-related initiatives built;
- academics integrate sustainability into their learning and teaching work and their research;
- cohesion strengthened within the group;
- reflective practice and self-awareness among participants enhanced.

The embedded model encapsulates the goal of sustainability-related curriculum change, that is, to embed sustainability into the curriculum, as well as a teaching and learning framework to realise this goal. Embeddedness as a notion informs how sustainability is represented in the curriculum, the forms of pedagogy used within the curriculum, the learning outcomes for students, and most significantly, the approach used to support academics to bring about curriculum and pedagogical changes. The embedded nature of these elements is theoretically discussed as significant to the achievement of sustainability learning. Facilitation is also a significant aspect of the embedded model. I undertook this role in the study as an academic developer whose professional practice includes facilitation to support curriculum change. This study brings the practice of many of these aspects together in a truly integrated way that has not been seen in the literature to date, since in practice, more often than not, only singular or a few aspects are practiced, researched and reported at a time.

This study seeks to consider programs whose discipline have no accreditation requirement to include a focus on sustainability. Arguably, these are the program areas where the challenge of bringing about change is greatest and where further research may make the greatest contribution. Programs of disciplines that include aspects of sustainability as core are not the focus of this study as these programs have an intrinsic impetus to include sustainability, such as programs that include sustainability as an accreditation requirement; for example, as in all Australian engineering degrees. This study is interested in exploring

bringing about change where such an impetus is not immediately evident or traditional to those within the program discipline.

As mentioned previously, there are few reports in the literature that address whole-of-program curriculum change to promote sustainability learning in higher education (Desha & Hargroves, 2014). While those existing cases of whole-of-program curriculum change generally explain the process of change, evaluation of the change process and change outcomes (i.e., academic and student learning) are not fully described or analysed. There is a need, however, for research about actioning and implementing curriculum change that moves beyond describing what supports and discourages sustainability-related curriculum change (Filho, 2011b). Yet, at the same time, it is well known how complex and difficult change to bring about in this area is. Not only is there a need to understand the process of change, the impact of change also needs to be better understood. Exploring process and outcomes relationships more thoroughly, as this study aims to do, has the potential to support the identification of the aspects of the curriculum change process that contribute more to achieving lasting sustainability learning.

Again, as mentioned earlier, achieving meaningful curriculum change is a complex process. Contextual dimensions of curriculum change influence one another: they may exacerbate or mitigate outcomes, they may not be easily teased out, and/or their combination might tell us something new. This study, therefore, seeks to better understand what occurs in the multidimensional and typical contexts of whole-of-program curriculum change as it occurs with the academics who design and teach the courses that make up the program. Such complexity requires exploration of the sustainability-related curriculum change at close quarters, in depth and over an extended period with the academics who are key to the curriculum change efforts as they are the ones charged with the design and subsequent teaching and assessment of the new curriculum, in line with multiple stakeholder perspectives and expectations (Barnett & Coate, 2005; Stefani, 2009). This study, therefore, provides insights into what occurs at the local program level context of curriculum change when change is located within a program team of academics, supported and facilitated by a university-based academic developer working in the physical surrounds of the learning and teaching environment and over an extended period of time. The research needed should occur in realistic contexts, warts and all. In response, this study therefore seeks to research sustainability curriculum change by practising and evaluating curriculum change in an authentic program context.

1.3 Aims and Research Questions

1.3.1 Research aims and objectives

Specifically, the study aims to:

1. develop an appropriate model for professional learning and project design to support sustainability-related curriculum change that draws on both the sustainability learning literature, the academic development literature and previous experience;
2. apply this model in the practice of a whole-of-program curriculum change project in context as a case study; and,
3. evaluate the curriculum change project to establish what has been achieved as a result of the project and consider the key success factors.

The identification and application of the curriculum change model, including the values underpinning the approach, can and should be informed by what is known to provide the greatest likelihood of the goals of the curriculum change being achieved; that is, the goal of graduates being more able to and inclined to contribute to a more sustainable world.

The evaluation of the outcomes of the curriculum change, that is, the learning that arises from it, requires comprehensive evaluation to be able to provide meaningful comment. This study contributes an action research curriculum change case study to the body existing research (Barth & Thomas, 2012). A challenge is how the case is conducted, evaluated and reported (Corcoran, Walker, & Wals, 2004b). Without the detail of how a curriculum change case project is conducted and evaluated, it is not possible to establish its contribution to what is known about sustainability-related curriculum change. The evaluation of the case in this study, therefore, includes rich descriptions, uses self-critical methodologies, and provides appropriate data and evidence to evaluate outcomes against process. Therefore, this study focuses on a single action research case project involving the academics teaching into the same program, specifically the Bachelor of Arts (Textile Design) at RMIT, Melbourne, Australia.

1.3.2 Research questions

Main question: How, if at all, does a facilitated action research curriculum change project contribute to sustainability learning within an Australian higher education context?

Sub-questions: What can be learned?

- What does a facilitated action research curriculum change project based on the “embedded model” suggest about the usefulness/appropriateness of this approach to support the embedding of sustainability in an Australian university degree curriculum?
- What aspects of the project context and implementation contributed most significantly to the project outcomes?
- What aspects of the project context and implementation impeded the project outcomes?
- How can the approach be improved?
- How might this inform future practice of sustainability-related curriculum change?

1.4 Research Design

The study design was informed by a literature review which identified action research as an appropriate method for both researching and undertaking curriculum change and is presented in Chapter 3. Action research is a well proven research methodology to bring about curriculum change and is philosophically aligned with sustainability-related curriculum change (Benn & Dunphy, 2009; Ferreira, Ryan, Davis, Cavanagh, & Thomas, 2009; Winter & Cotton, 2012). A brief overview of action research is provided below.

1.4.1 Action research

The philosophical underpinnings of action research are reflected in the four principles of critique, participation, action and research. In this approach a group works together to address or progress an issue (or problem) that is pertinent to the group. This involves the group reflecting upon and questioning the current circumstances and systems that have generated the issue and actively taking steps for improvement and change. Data is gathered that is analysed and reflected upon to provide insight into the issue and the process of its resolution. The action research process leads to both new practices and theories about practice at the local level, which is made public in the form of research output.

In this study, the action research process was conducted consistent with the model provided by Coghlan and Brannick (2010). An action plan was developed and implemented, employing three cycles of action research. These were undertaken between late 2008 and 2011. The curriculum was redesigned during 2009 and implemented in 2010, and the implementation and the project overall was reviewed during 2011. Following the

final cycle, some ongoing activities continued between myself and some members of the group (see Figure 1.1).

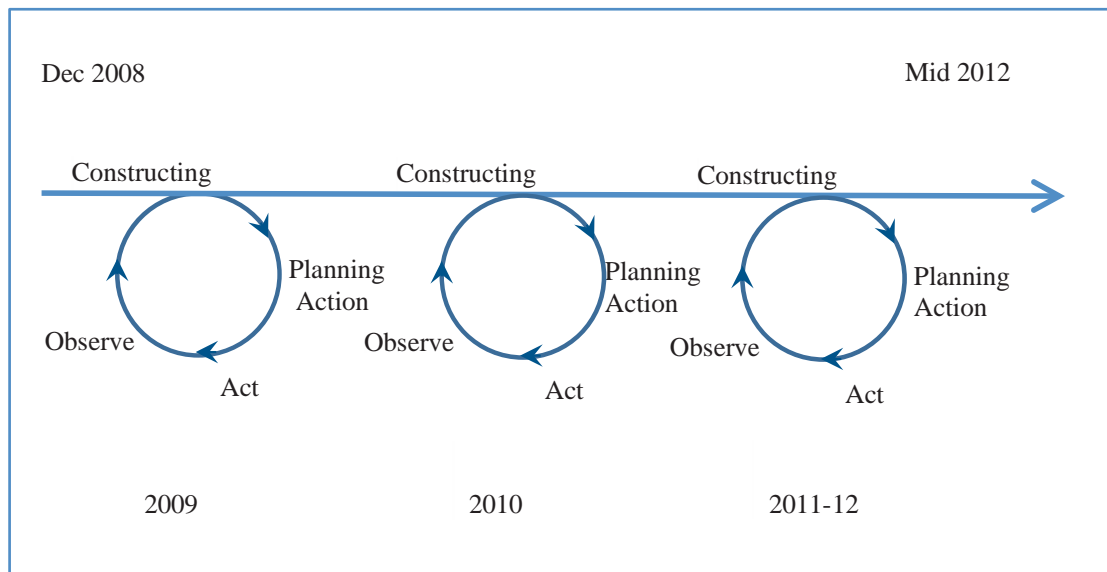


Figure 1.1: Timing of Action Research Cycles.

Data collection was undertaken to serve two main purposes. First, throughout the project, data was collected to be used locally and to inform the action research cycles, where it was reflected upon to identify progress and to plan further improvements. Some data was specifically collected to inform the overall evaluation of the curriculum change project.

Ethics approval to conduct this study of research involving human participants using an action research methodology was granted by the RMIT, College of Design and Social Context, and Human Research Ethics Committee prior to commencing the study. During the study fieldwork, variation to the original ethics approval of research was sought and granted. With the agreement of study participants, the amendment allowed the program involved in the study to be identified in this thesis and related publications. In the next sections I provide an overview of the action research process.

1.4.2 Pre-step: Background and context

The pre-step stage is where I first made contact with and then went on to meet and get to know the group I would be working with on the curriculum change project. As mentioned, the program was the Bachelor of Arts (Textile Design) (TD Program), within the School of Fashion and Textiles at RMIT, Melbourne, Australia. The group was made up of the seven

academics out of a total of seven, who taught the majority of the program's courses. Each academic was responsible for the curriculum design, teaching and administration of at least one course in each semester of the program, so that each course in the program was coordinated by one or other member of the group. All had experience working as textile designers in industry.

To inform the taking of a learner-centred approach, as well as as a basis for relating changes later on and in recognition that I had arrived with my own story amongst others “in the midst of living their stories”, within community and institutions (Clandinin & Connelly, 2000, p. 1), I sought to capture and report their stories through interviews, conversations and visits. I believed that to understand how to best adapt my facilitation to the needs of the group, it was important to understand their working context. I, therefore, spent time listening to and getting to know these academics. I learnt about their discipline, their program and their School environment. To cultivate collaboration and participation I also sought to build relationships with members of the group. I shared information about myself, my background and my tentative ideas of how we might approach the project. After four or so months of interviews, conversations and visits, I proposed a project plan that I believed captured and reflected the group's values, needs and expectations. The group made some improvements to the plan, which then formed the basis of the first action research cycle. A summary of what occurred, what the outcomes were and what I learnt in the pre-step stage is presented in Chapter 4.

1.4.3 Action research cycles 1, 2 and 3

The study, as shown in Figure 1.1, covers three action research cycles of the facilitated curriculum change project. Through the stages as a group, we developed intentions, planned actions, undertook action and reviewed the outcomes of the action. Each cycle used an emergently designed range of activities to support the aims of the cycle along with professional development activities and collaborative tasks that sought to address the intentions of the cycle. These included group workshops, scholarly activities and team teaching. The first cycle focussed on developing a shared understanding of sustainability within the textile design (TD) discipline, mapping these against the existing curriculum, and developing sustainability-related learning outcomes in relevant courses. Some teaching trials were also conducted. The second cycle focussed on teaching the new first semester learning outcomes. The third cycle focussed on teaching the new second semester learning, as well as assessing sustainability learning outcomes.

Included are my reflections on my experience of the action research project and of undertaking the study (McNiff & Whitehead, 2010). McNiff and Whitehead (2010) suggest that a study such as this one includes a focus on empowering the action researcher, to make a difference to a situation and to their professional practice: “[t]he purpose of your enquiry is to change what you are doing in the light of how you see yourself influencing your situation” (p. 39). In line with this, questioning my practice through reflection on it allowed me to understand and improve my practice. It also allowed me to be a potential role model for others on the basis of presenting the findings to other practitioners in this area.

I, however, acknowledge and recognise the degree of subjectivity associated with this aspect. I, therefore, include in this process strategies to help transcend my subjectivities through the collaborative process by appropriate data collection and analysis, communicating continually with the team to allow them to assess for themselves what had occurred and how I had interpreted it. The strategies to evaluate and test the validity of the study are presented in Chapter 3.

Overall, the study was about envisioning higher education curricula that have sustainability embedded as core to the learning it inspires. In the process it explored: What do professionals like me, who work in higher education curriculum change, need to be doing differently to support this vision and what is the significance and contribution of the reflective practitioner to the process of realising a vision of the sustainability curriculum?

1.5 Framing the Study

As mentioned previously, the identification of the need to support sustainability-related curriculum change arose from the literature and my previous academic development professional practice which served to frame the study. I brought to the study a career in education, first in secondary schools and later in higher education. In secondary schools, I taught mathematics and sciences. At the commencement of the study I had worked at RMIT for 10 years in academic development, using a range of approaches to support the improvement of student learning and teaching quality. This included supporting curriculum design, leading tertiary teacher education, undertaking educational quality review and enhancement, researching student transition, and contributing to policy development and implementation support. The work occurred across vocational, undergraduate and postgraduate learning environments and across academic disciplines in the Health, Engineering and Science discipline areas.

The study began with me identifying a practical issue or problem needing to be addressed (Zuber-Skerritt & Fletcher, 2007) or needing improvement (Burns, 2000). In this case, the first stage started with me recognising a gap in how graduate attributes were embedded in programs. In my academic development role I was involved in a re-energised university initiative to embed the university's graduate attributes through curriculum change projects. I observed graduate attributes relating to sustainability were often addressed superficially, if at all, within the new curricula. This situation grated on me. I had a strong personal commitment to sustainable practice and now saw meaningful opportunities to extend these to my professional practice. Yet I felt ill equipped to do so. The academics and the academic developers supporting them were able to translate and map many of the graduate attributes, yet struggled with those relating to sustainability. I saw gaps in my colleagues' practice and in my practice: we did not understand how to support meaningful sustainability curriculum change and were largely leaving this unaddressed. I resolved to investigate and hopefully address, from within my professional practice and as my own professional development, the reasons for the "missing" or "unembedded" sustainability graduate attributes in higher education curricula. I asked myself what I, as an academic developer, could contribute?

1.6 The Research Context

The context for the study was the Bachelor of Arts (Textile Design) in the School of Fashion and Textiles, located at the Brunswick campus of RMIT University in Melbourne, Australia. Further, at the commencement of the study I was a staff member working at RMIT.

1.6.1 The RMIT curriculum and sustainability

RMIT, in Melbourne, Australia, has been selected as the location of this study because RMIT had been a signatory to the Talloires Declaration since 1995. It espoused a commitment to the capability of every graduate having "an appreciation of global sustainability issues (environmental, social and financial)" (Hart, 2003, p. 1), among other capabilities.

At the commencement of this study, RMIT already had a level of engagement in sustainability and was not entirely new to sustainability learning and teaching at that time (Lang, Thomas, & Wilson, 2006). For example, an existing level of engagement in sustainability learning can be identified at RMIT by Lang et al. (2006). Publications such

as “Protecting the future: Stories of sustainability from RMIT” (Holdsworth & Caswell, 2004) demonstrate existing examples of academic engagement in sustainability learning. A number of RMIT programs included sustainability learning, especially in discipline areas where the focus was on sustainability – for instance, environmental science, environmental policy and community development. A number of discipline areas had professional requirements to incorporate sustainability into programs; for example, Engineers Australia (2008) mandated that all undergraduate engineering programs addressed aspects of sustainability. In other examples, individual academics saw sustainability as relevant to their own teaching and had, in relative isolation, endeavoured to create a sustainability focus in their courses. A selection of examples of this work at RMIT had been reported on a number of years before by Holdsworth and Caswell (2004).

This was, however, more ad hoc than by design. Since, at the same time, there was no real requirement or systemic or specifically dedicated support for academics to embed sustainability into their curriculum within RMIT. Curriculum development support was available for general teaching and learning enhancement or dedicated learning and teaching initiatives primarily from individual College offices². Supported curriculum change initiatives focussed on online learning and work-integrated learning in preceding years. General academic development support was in limited supply, focussing on priority degrees and applying graduate attributes.

As indicated previously, university sustainability stated commitments and intentions do not always readily translate to change in practice (Filho, 2011a). This was confirmed with a 2010 sustainability learning audit of RMIT's undergraduate and TAFE programs that showed two of 23 schools (both engineering) demonstrated “most programs have a substantial sustainability presence in programs”, seven schools demonstrated “a moderate sustainability presence OR a minority of programs have a substantial sustainability presence”, ten schools demonstrated “a minority of programs have a moderate sustainability presence” and four schools demonstrated “a minor proportion of programs have a slight sustainability presence” (de la Harpe & Wahr, 2010, p. 4). It is noted that the audit considered the presence of sustainability in the written curriculum only. The curriculum as taught was not considered in the audit. More recently RMIT had reported to

² RMIT's organisational structure has three Colleges where academic work occurs: the College of Social and Constructed Environment; the College of Science, Engineering and Technology; and Business. Each college has a number of Schools responsible for teaching and learning (programs) and research in their respective discipline areas.

the United Nations in 2013 that 13 of more than 90 undergraduate programs have a sustainability focus (RMIT University, 2013b).

In addition, RMIT's 2010 sustainability action plan (RMIT University, 2010, p. 10) states RMIT is still to "integrate RMIT's sustainability graduate attribute (sic) into all [higher education] programs", yet aims to do so by 2015. Since 2010, RMIT has presented a strengthened commitment to sustainability by establishing the "... RMIT Sustainability Committee ... to build on existing practice in a systemic way" (RMIT University, n.d.-b) and subsequently developing a sustainability policy (RMIT University, 2012b) and an action plan (RMIT University, 2010) to report on progress.

In 2006 a Sustainability Victoria funded project entitled "Beyond Leather Patches" (Holdsworth et al., 2006), as well as an Australian Research Council grant awarded to extend the work (Hayles & Holdsworth, 2008), had been undertaken at RMIT to support academics to embed sustainability into their courses. This work was not directly affiliated with RMIT's learning and teaching or sustainability learning initiatives, but as an independent research project undertaken at RMIT focussing on embedding sustainability into single courses in a number of programs. Despite changes to the written curriculum of the courses reported, Holdsworth et al. (2009, p. 51) acknowledged that "... despite obvious enthusiasm from individuals involved in the project, transforming isolated innovations into embedded practice has not been particularly successful", highlighting the difficulty of bringing about such change.

In summary, during 2007–08, RMIT's involvement in new sustainability-related curriculum change tended to rely on isolated grassroots efforts with individual courses as the focus for change, led by and involving one or two academics in isolation. The graduate attributes provided a rationale for a sustainability focus; however, whether this was explicitly reflected in the curriculum was not mandated and decided at the local level. There appeared limited organisational leadership from the University overall to provide a driver for engagement in the project and sustainability curriculum change. In short, sustainability-related curriculum change at RMIT was neither consistent nor pervasive.

In the case of RMIT, therefore, the inclusion of sustainability in the curriculum was more dependent on localised drivers and factors located within each School and associated with the academics, rather than the policy and practice directions set by university management.

So, what were the drivers for the School and academics to become involved in a sustainability-related curriculum change project?

1.6.2 The textile design discipline

There is recognition within the field of textile design and manufacture that the industry is responsible for highly unsustainable practices, particularly in those related to environmental and social implications (Allwood, Laursen, Malvido de Rodriguez, & Bocken, 2006; Hiller Connell & Kozar, 2012; Underwood, 2009). Within the higher education academy, at least, there are calls for a greater commitment to more responsible and sustainable practices in the industry (Fletcher, 2008). Correspondingly, there is a call for programs in these discipline areas to teach students about sustainability and sustainable practices as they relate to these industries (Hiller Connell & Kozar, 2012). Indeed, in 2008, the International Textiles and Apparel Association introduced sustainability-related learning objectives for 4-year programs within the discipline (Hiller Connell & Kozar, 2012).

1.6.3 The program

The facilitated action research project to bring about sustainability curriculum change involved working with the academics who taught into the TD Program within the School of Fashion and Textiles at RMIT over a 3-year period from late 2008 to 2011. The project was conducted on RMIT's Brunswick campus, located in the inner northern suburbs of Melbourne, Australia, where the TD Program is taught.

The TD Program is a 3-year program preparing students to graduate as textile designers, and where they develop concepts and practically realise these as marketable products primarily within and for the fashion, interior, and the automotive industries (Underwood, Wahr, Lynas, & Beale, 2011). The TD Program has 22 specific TD courses, all coordinated and largely taught by the academics involved in the project, as well as two general electives. Courses are occasionally taught by sessional staff. Prior to the curriculum change project, one course explicitly taught sustainability-related content, and graduate attributes had not been formally integrated into the program.

As a result of the project, sustainability was embedded into 16 of the 22 TD courses within the program. Three collaboratively authored papers were published (Underwood et al., 2011; Wahr & Underwood, 2010; Wahr, Underwood, Adams, & Prideaux, 2013). In 2011, the TD program was awarded two substantial sustainability awards for their work

associated with the project; the state-based Victorian Premiers' Sustainability Tertiary Education Award (Sustainability Victoria, 2012) and the Australasian Green Gown Learning and Teaching Award (Australian Campuses Towards Sustainability, 2011). In addition to these outcomes, substantial sustainability-related learning resulted for academics, students and myself, which is the primary subject of this thesis.

In the next section an overview of how the thesis is organised is provided.

1.7 Organisation of the Thesis

Chapter 1, this chapter has outlined the context and rationale for the study. It framed the research gaps that are addressed within the study and the approach used to undertake the study.

Chapter 2 presents a review of the literature, concluding with the identification of an appropriate academic development approach to support curriculum change to embed sustainability into the curriculum. It reviews the theories and practice of both sustainability learning and academic development and how these relate to supporting sustainability-related curriculum change in higher education, as well as considering the challenges and drivers of various approaches. The chapter recommends a facilitated action research project as the academic development approach most appropriate and, thus, the approach implemented as the basis for this study.

Chapter 3 describes the research design for the study in depth. It presents the theoretical underpinnings and practice of action research methodology and how this applies to the study. Gaining access to the participant group and the ethical implications and limitations of the methodology are presented, as well as the data collection and analysis techniques used.

Chapter 4 describes the “pre-step” or context to the action research project, which framed the project plan. Data about the existing curriculum, the University and school environment, and group of academics teaching into the BA (Textile Design) at RMIT University is presented and analysed as the starting point for the project and the basis for analysing change presented later in the thesis.

Chapter 5 describes the curriculum change project. The chapter uses the action research cycles to outline the process for constructing understandings of the issue and then to plan, action and evaluate changes. Three cycles of action research are presented focussing on the

process undertaken in each cycle, including group activities, a synthesis of the data collected, reflections on the work, and the group's local theorising and findings. Consideration of the embedded model as a professional learning experience is also presented.

Chapter 6 establishes the overall learnings from the study. It reflects upon and discusses the action research project process in relation to the aims of the project and the actual curriculum changes made, including the sustainability learning arising from the project. It relates the actual curriculum change practice to associated theoretical themes to identify the contribution that the facilitated action research project approach has made to the curriculum change, and considers the significance of a range of factors present in the project.

Chapter 7 presents the overall conclusions and implications for how the research outcomes might be useful in other contexts. This chapter includes recommendations for further research in the area.

1.8 Chapter Conclusions

While there are calls for sustainability-related learning to be included in higher education curricula, there are few examples of where this has been achieved successfully. As indicated above, curriculum change projects are unique and are impacted by the context of the change. To address this, more action-oriented research of actual and detailed examples of curriculum change are needed where the outcomes of curriculum change are included in the study and analysed in relation to the curriculum change process. A review of the sustainability- and academic development-related literature and integration of previous academic development practice experience indicated an action research project that embodies notions of "embeddedness" was an appropriate model to support sustainability-related curriculum change. This study explored in depth the many dimensions of curriculum change through a facilitated action research project that was responsive to the needs and circumstances of the participants, and aimed to mitigate barriers to change in order to bring about the much needed higher education sustainability related curriculum change.

Chapter 2: Achieving Sustainability Curriculum Change: What We Know About the Sustainability Curriculum, Issues Impacting Implementation and Ways to Support It

2.1 Introduction

Higher education curricula that suitably integrate sustainability principles as part of the curriculum and learning outcomes enable graduates to contribute to a sustainable future. There is strong agreement that teaching university students about sustainability and to act more sustainably in their chosen professions is a necessary part of a university education (Corcoran & Wals, 2004; Decade for Education for Sustainable Development, 2009). Appropriate changes to curricula are, however, often slow and superficial. The aim of this study is, therefore, to explore how sustainability-related curriculum change might be undertaken that is deep and transformative. Focussing on the program as the holistic learning experience of students, the study explores the contribution academic development can make to support and engage academics in a curriculum change project at program level. More specifically, the study considers professional learning approaches that enable academics to make changes to their curricula to support students' sustainability learning.

The chapter begins by introducing the sustainability literature. The nature of sustainability learning and the learning outcomes consistent with sustainability learning are explored. In turn, these learning outcomes are then discussed in relation to their implications for the design of curricula and how they are taught, highlighting the need for holistic and deep approaches to learning across a program.

Given the challenges of implementing sustainability-related curriculum change, the next section considers the reasons why sustainability-related curriculum change has been slow and largely superficial to date, by examining and analysing the barriers to and drivers for change. A significant factor influencing change are academics' own experiences and understandings of sustainability. The academic development literature is reviewed in the light of what has been identified about sustainability learning, curriculum change and barriers and drivers affecting change. This section focusses on approaches to support academics' professional learning to enable development and implementation of curricula that are likely to result in lasting sustainability learning for students. Eight fundamental aspects of an academic development approach are identified that together provide the greatest potential for achieving lasting sustainability-related curriculum change at program level. The chapter concludes by arguing for an approach characterised as program

focussed, localised, participative and reflectively facilitated. This is described in Chapter 3 as the embedded model. While focussing on professional learning to bring about sustainability-related curriculum change, the embedded model is implemented and evaluated within this study.

2.2 Education for Sustainable Development and Education for Sustainability

The United Nations (UN), through the United Nations Educational, Scientific and Cultural Organisation (UNESCO), has taken a lead on promoting education that supports a more sustainable world, and refer to this as Education for Sustainable Development (ESD). ESD is most often defined by its goals. It is learning that:

... aims to help people to develop the attitudes, skills, perspectives and knowledge to make informed decisions and act upon them for the benefit of themselves and others, now and in the future. ESD helps the citizens of the world to learn their way to a more sustainable future. (UNESCO, n.d.-b).

The UN is closely involved in promoting ESD in all educational sectors around the world by fostering collaborative international research and programs, including the declaration of 2005–2014 as the Decade for Education for Sustainable Development (DESD). The UN's most recent characterisation of ESD includes a blend of values, scope, teaching approaches and learning outcomes. It is a deliberately broad term allowing for and encouraging local contextualisation. The UN thus describes ESD as follows:

ESD has essential characteristics that can be implemented in many culturally appropriate forms. Education for sustainable development:

- is based on the principles and values that underlie sustainable development;
- deals with the well-being of all four dimensions of sustainability – environment, society, culture and economy;
- uses a variety of pedagogical techniques that promote participatory learning and higher-order thinking skills;
- promotes lifelong learning;
- is locally relevant and culturally appropriate;
- is based on local needs, perceptions and conditions, but acknowledges that fulfilling local needs often has international effects and consequences;
- engages formal, non-formal and informal education;
- accommodates the evolving nature of the concept of sustainability;
- addresses content, taking into account context, global issues and local priorities;

- builds civil capacity for community-based decision-making, social tolerance, environmental stewardship, an adaptable workforce, and a good quality of life;
- is interdisciplinary. No single discipline can claim ESD for itself; all disciplines can contribute to ESD. (UNESCO, n.d.-a)

In response to its UN commitments, the Australian government has contextualised ESD as education for sustainability (EfS), which refers to a set of principles consistent with the UN's ESD characteristics, as follows. EfS is based on the following principles:

- Transformation and change – Education for sustainability is not simply about providing information but involves equipping people with the skills, capacity and motivation to plan and manage change towards sustainability within an organisation, industry or community;
- Education for all and lifelong learning – Education for sustainability is driven by a broad understanding of education and learning that includes people of all ages and backgrounds and at all stages of life and takes place within all possible learning spaces, formal and informal, in schools, workplaces, homes and communities;
- Systems thinking – Education for sustainability aims to equip people to understand connections between environmental, economic, social and political systems;
- Envisioning a better future – Education for sustainability engages people in developing a shared vision for a sustainable future;
- Critical thinking and reflection – Education for sustainability values the capacity of individuals and groups to reflect on personal experiences and world views and to challenge accepted ways of interpreting and engaging with the world;
- Participation – Education for sustainability recognises participation as critical for engaging groups and individuals in sustainability; and
- Partnerships for change – Education for sustainability focuses on the use of genuine partnerships to build networks and relationships, and improve communication between different sectors of society.

(Department for the Environment, Water, Heritage and the Arts, 2009, p. 9)

ESD and EfS are broad terms allowing for deliberate openness in their interpretation (Wals, 2010a). In terms of learning and teaching, both the UN's ESD characteristics and Australian government's EfS principles include learning outcomes: for instance, critical thinking skills: understanding of the connections between social, environmental, economic and political systems: and pedagogical considerations (e.g., participation, partnering and interdisciplinarity).

Beyond the UN, interpretations and characterisations of ESD and learning relating to sustainability vary and have been strongly debated (Dale & Newman, 2005). This debate has promoted a maturation of ideas for those working in the field (Barth & Thomas, 2012). Sterling (2004a) explains the background to the evolution of the term “ESD”. The terms “ESD” and “EfS” emerged out of the 1992 World Summit, which produced Agenda 21 (United Nations, 1992), and built upon notions of environmental education (EE) and ecological literacy, where environmental education is the ability to understand the impact of humanity on the environment and to develop appropriate responses to address these (Wright, 2004). ESD builds on this concept to include reflexivity and action for change as it seeks to equip “learners with the necessary skills to be able to take positive action to address a range of sustainability” through “reflection on” and “systemic change” to current practices (Tilbury & Cooke, 2005, p. 4). ESD and EfS sought to include development education “to encompass the social, economic and environmental dimensions of change and of alternative futures” (Sterling, 2004a, p. 49). EfS is distinguished by Sterling as seeking to go beyond the “too instrumentally oriented” and outcomes focus of ESD to include value-based learning and change (p. 49). “Sustainable education” is a further development in this continuum of learning theories while encompassing the elements of EE, ESD and EfS, which calls for a “change of educational paradigm as a whole” (p. 49). According to Sterling, sustainable education (SE) seeks to achieve more than Agenda 21 goals by creating education systems that ask learners to recognise and challenge the existing systems that resulted in the sorts of problems Agenda 21 seeks to address; that is, to question the underlying premises for how humanity operates, including the existing educational systems.

In terms of this study, and as stated in Chapter 1, I use the term “sustainability learning” to refer generally to learning that supports the goals of ESD as per the UN and EfS. This is not unusual as, for instance, parts of the literature readily conflate the terms “ESD” and “EfS” (see, e.g., Mochizuki & Fadeeva, 2010). I do this to avoid limiting the scope of the study by normatively privileging one term over another, but also to reflect the more recent shift to the validation of multiple perspectives or heuristic relativism in the use of these terms (Wals, 2010a). This chapter, therefore, draws on and synthesises the literature referring to ESD, EfS, and sustainable education in order to inform the study. Whether or not sustainability learning is considered a “new educational paradigm” in itself (Barth & Thomas, 2012, p. 752), I see sustainable learning as a holistic educational approach, incorporating the multiple interpretations presented above. Sustainability is an inherently

complex concept (Lourdel, Gondran, Laforest, Debray, & Brodhag, 2007); core to sustainability learning, therefore, are critical thinking, social learning, local contextualisation and change, necessary to relate to and make sense of and act upon questions of sustainability. Sustainability learning is intrinsically sustainable itself, aiming to contribute to the perpetuation of sustainable practice through learning.

2.2.1 Sustainability learning outcomes

Across the higher education sector worldwide there is considerable discussion about changing the curriculum to focus on sustainability learning, in order to address growing concerns about the future viability of life on Earth (Gough & Scott, 2007; Stephens et al., 2008; Sterling & Thomas, 2006). A number of aspects and approaches are outlined in the literature as characteristic of sustainability learning and to which academics should aspire in order to demonstrate that they have met the goal of integrating sustainability learning into the curriculum. The most mentioned aspects are synthesised below.

The UN's call for sustainability learning to be included as core learning for all suggests that in higher education sustainability learning should be considered a graduate attribute. As discussed in Chapter 1, graduate attributes are the "work and life skills and abilities [that] provide the context in which disciplinary knowledge is demonstrated and are seen to underpin university graduates' capacity to perform effectively in an increasingly globalised and complex workplace and to contribute within a diverse community" (de la Harpe et al., 2009, p. 1). A university's given graduate attributes are core to each graduate's learning outcomes. The goals of sustainability learning align with the purpose of graduate attributes. Bosanquet, Winchester-Seeto, and Rowe (2010) identify four overlapping purposes of graduate attributes from the literature: graduate attributes contribute to the employability of graduates, support the holistic development of the individual over their lifetime, provide skills to deal with an uncertain future, and prepare graduates to promote social justice. Sustainability learning responds in turn to these purposes. First, the above range of skills, knowledge and beliefs are valued by employers (Precision Consulting, 2007) and can be taught in a range of learning contexts including sustainability related learning. Second, sustainability learning, including critical and systemic thinking, support lifelong learning (UNESCO, n.d.-a). Third, sustainability learning specifically prepares graduates to deal with uncertainty by specifically aiming to support strategic and anticipatory competences (Gough & Scott, 2007). Fourth, sustainability learning's primary remit is to address matters of justice, both social and ecological (UNESCO, n.d.-a).

Gough and Scott (2007) see sustainability learning as implicit within and core to all citizenship development, including higher education, rather than as a specialism in itself; an approach or perspective that enhances and strengthens existing disciplines. Sustainability learning is seen as a graduate attribute (Sterling & Thomas, 2006), with an increasing number of Australian universities, among them RMIT, including graduate attributes with aspects of sustainability learning (Bosanquet, et al., 2010; Lee, Barker, & Mouasher, 2013; Thomas, Barth, & Day, 2013).

As mentioned, sustainability learning comprises “attitudes, skills, perspectives and knowledge” (UNESCO, n.d.-a). Consistent with the varied interpretations of sustainability learning, these are also diverse. Sustainability learning is explored below, followed by a summary of how it is viewed in relation to this study. First and most often mentioned is that sustainability learning includes a number of generic sustainability skills, competencies or literacies that need to be contextualised to the discipline and specific learning environment. Many proponents present their own lists of skills and competencies. For example, UNESCO’s International Implementation Scheme Draft includes “... skills for creative and critical thinking, oral and written communication, collaboration and cooperation, conflict management, decision-making, problem-solving and planning, using appropriate ICTs, and practical citizenship” (UNESCO, 2005, p. 28). Cade (2008, p. 22) suggests “... professional sustainability competencies include the ability to analyse using many disciplines; to act as a responsible citizens locally and globally; to plan for the long term as well as the short term; and to use resources efficiently”.

These lists share common and overlapping elements. Dale and Newman (2005, p. 357) synthesise these as two sets of skills referring to fact-based skills and process-based skills, where fact-based skills are the specific underpinning content and situational knowledge and processed-based skills refer to skills for developing the perspectives and the capability to undertake analysis and bring about change.

Fact-based skills: systems theory; related disciplinary-based knowledge pertaining to the ecological, social and economic imperatives; natural and social science research methodologies; action research; and governance.

Process-based skills: systems thinking; interdisciplinary and transdisciplinary research methods; perspectives taking and perspectives making; contextual appreciation and

analysis; barriers analysis; backcasting and scenario building; multi-stakeholder processes; and values articulation.

Such lists of skills, attributes and competencies emphasise how sustainability learning needs to include opportunities for learners to think systemically and in multi- and trans-disciplinary ways (Wals & Jickling, 2002), and to anticipate the future (Gough & Scott, 2007). Systemic thinking provides the necessary perspectives to understand and respond to the inherent complexity of sustainability. Social and natural systems make up the world, and systemic thinking allows learners to identify the multiple elements within systems and to understand how these interact and impact to manifest as change over time (Baldwin, Paul, & Scoble, 2000; Blackmore, 2005; Cairns, 2005; Glasser, 2004). Interdisciplinary approaches are also needed to solve sustainability problems, given such problems are complex and cannot be addressed by one discipline alone. Moreover, multi and trans-disciplinary perspectives highlight the multiple elements that fit together within a system (Blewitt, 2004).

Second, sustainability learning includes an emphasis on the affective learning domain, including values, attitudes and beliefs (Rowe, 2002; Shephard, 2008). This emphasis is seen as vital, since affective dimensions are major influences of behaviour. The most cited affective dimensions associated with sustainability learning include empathy and care for others, discord with unsustainable practices and a willingness to explore options and make more sustainable decisions (Sipos, Battisti, & Grimm, 2008). Essentially, the curriculum should “[m]ake students aware of the values that are present in the professional’s work and options for their own role in global challenges” (Mulder, 2007, p. 155).

Third, sustainability learning primarily emphasises emancipatory education that supports change above other knowledge and skills (Scott, 2002). Through the use of critical and reflective pedagogies in the learning environment, specific learning outcomes are identified in context (Varga, Kószó, Mayer, & Sleurs, 2007). With this perspective, critical thinking as an activity is more significant than specific learning or other outcomes: “[t]he processes of searching and engaging are as important, if not more important, than their outcomes as it is these processes that help create a reflexive and ‘learning’ society that is capable of responding to setbacks, crises, challenges, and so forth” (Wals, 2010a, p. 147). Sustainability learning is seen as political as it aims to achieve social change by critiquing the current approaches that have led to unsustainable outcomes (Cranton, 2009). Learners develop capacity to understand complexity and transdisciplinarity (Dale & Newman, 2005)

and appreciate multiple perspectives or heuristic relativism (Wals, 2010a). Emancipatory education seeks “to help the learner challenge presuppositions, explore alternative perspectives, transform old ways of understanding, and act on new perspectives” (Mezirow, 2002, p. 18). This requires transformative learning: encouraging critical and reflective approaches to learning, where multiple perspectives are valued and shared, existing assumptions are examined and questioned and new understandings are formed that inform future actions (Huckle, 2004; Sterling, 2004a; Wals, 2010a; Wals & Jickling, 2002). Learning experiences that promote transformation generate a sense of “personal disturbance (dissonance)”, uncertainty and high-risk for learners (Barnett & Coate, 2005, p. 258). Emancipatory education enables action and change as deeply held social norms, assumptions and paradigms are observed and critiqued.

Specifically in relation to higher education, Wiek, Withycombe, and Redman (2011, pp. 207–211) summarise the available lists of sustainability learning-related attitudes, skills and competences into the following five overarching competences. These are seen to complement and build upon “basic” competencies already found in academic programs; for example, critical thinking skills and communication skills.

Systems-thinking competence: the ability to collectively analyse complex systems across different domains (e.g., society, environment, economy) and across different scales (local to global), thereby considering cascading effects, inertia, feedback loops and other systemic features related to sustainability issues and sustainability problem-solving frameworks.

Anticipatory competence: the ability to collectively analyse, evaluate, and craft rich “pictures” of the future related to sustainability issues and sustainability problem-solving frameworks.

Normative competence: the ability to collectively map, specify, apply, reconcile, and negotiate sustainability values, principles, goals, and targets.

Strategic competence: the ability to collectively design and implement interventions, transitions and transformative governance strategies toward sustainability.

Interpersonal competence: the ability to motivate, enable and facilitate collaborative and participatory sustainability research and problem solving.

In summary, sustainability learning enables the learner to understand the complex nature of sustainable as well as unsustainable practices, to be concerned about the impact of unsustainable practices, and to be empowered to work with others to address unsustainable practices by having appropriate vision, knowledge and skills, as well as act to bring about change. The specific learning outcomes used to achieve this can be viewed as a set of competences to be designed into a curriculum or as an overarching pedagogical approach or a combination of both. The next section considers the ways these skills, attitudes and competences are best taught.

2.2.2 Teaching sustainability learning

Mochizuki and Fadeeva (2010) caution against simplistic use of sustainability learning competency frameworks in curriculum design that can result in surface or shallow learning, in favour of integrated approaches. Sterling (2004a, p. 53) and others (Huckle, 2004) stress conceptual changes or “a change in educational paradigm” are first required by learners for them to engage in sustainability learning. For Sterling, this includes changes to “transaction/constructivist” approaches to learning, and for others critical approaches to learning (Banerjee, 2004; Tilbury, 2004; Wals & Jickling, 2002).

Tilbury recommends “newer forms of personal, political and social learning as well as a critical pedagogy” to bring about sustainability learning (Tilbury, 2001, p.88). Best practice pedagogies for sustainability learning require learners to become immersed in sustainability issues (Cotton, Warren, Maiboroda, & Bailey, 2007) and to explore the multiple dimensions of sustainability holistically and how these interact (Dawe, Jucker, & Martin, 2005; Tilbury, 2004). Learning experience as well as content knowledge acquisition are therefore emphasised (Jickling, 1997), with an emphasis on cognitive, psychomotor and affective domains of learning (Sipos et al., 2008; Sterling, 2010). Recommended pedagogical approaches are characterised as non-prescriptive and open ended (Wals, 2010b), and include “critical reflection, values clarification and action research” (Tilbury, 2004, p. 106), “authentic, inspiring, and driven by existential issues” (Wals, 2010b), and democratic, experiential and self-actualising approaches to empowering learners (Cotton, et al., 2007; Domask, 2007; Wals, 2010b), “using constructivist methods” (Meyers, 2006, p. 465).

Transformative learning is the overarching learning theory presented in the literature to achieve the goals of sustainability learning (Cranton, 2009; Sterling, 2010; Thomas, 2010; Wals, 2010b, 2011).

According to Mezirow (1991), transformative learning is a particular form of constructivist learning, where “we interpret an old experience (or a new one) from a new set of expectations, thus giving a new meaning and perspective to the old experience” (p. 11). The constructivist view of learning considers learners as engaging in an activity to create (construct) new understandings (Biggs, 2003b) and suggests meaning is influenced by the social contexts of the learner (Angelo, 1999; Trigwell & Prosser, 1997). When encountering a phenomenon that is not understood, a new explanation, based on past interpretations, must be developed. New conceptions, therefore, are developed, validated and reinforced by referencing the external world. Hence, the framework for viewing the world, one’s worldview, has changed. Learning, therefore, results in a change in worldview (Biggs, 2003b; Moon, 2004; Ramsden, 1992).

According to this constructivist view, one’s worldview forms early (Pajares, 1992), tends to be tacit (Argyris & Schön, 1974; Mezirow, 1991) and is based on past experience (Mezirow, 1991). One’s worldview has a political basis as it is constructed and shaped by the influence of traditions and social paradigms that one experiences and learns consciously or unconsciously (Cranton, 2006; Fullan, 2001; Gallagher, 1992; Olsen, Lodwick, & Dunlap, 1992). For instance, within academic disciplines, the prevailing culture and traditions of the discipline influence each academic’s view of “goals in education” (Becher & Trowler, 2001, p. 195). This is also often how attitudes to sustainability learning and sustainable development form (Fien & Tilbury, 2002; Hopkins & McKeown, 2002) and consequently how intentions to act and actions are influenced (Adams, 2004). By seeking to understand and make more conscious the individual’s worldview, it becomes possible to develop a basis for a “learner centred” approach to teaching; that is, starting where the learner is.

Lasting change in how a person acts requires changes in worldview (Fullan, 2001). Deeply held worldviews, however, are hard to change (Eckel & Kezar, 2003). Individuals experience “internal inconsistency” (Argyris & Schön, 1974, p. 21) or dissonance (Mezirow, 1991) when they reflect and critically analyse a situation to consider the need for and the nature of change (Eckel & Kezar, 2003). Dissonance can also arise from reflection on a disorienting event (Mezirow, 1991). When dissonance occurs, an individual can respond in one of two ways. They can accommodate the internal inconsistency. This is single loop learning, whereby the existing worldview is largely maintained (Argyris & Schön, 1974). When the internal consistency cannot be accommodated, the individual’s

worldview may be reconsidered and changed; this is “double loop learning” or deep learning. Change in practice or “reflective action” may also result if the individual is empowered to change (Mezirow, 1991, pp. 106–107).

Critical reflection is reflection on the assumptions on which our beliefs are based. When applied to experience, critical reflection involves one or more of three aspects of this experience: on what occurs (content reflection), how it occurs (process reflection), and why it occurs (premise reflection; Cranton & King, 2003). All three forms of reflection are beneficial and valid; however, it is premise reflection that drives transformation. Achieving transformative learning depends on both the disposition of the learner and the learning environment (Kasworm & Bowles, 2012). Achieving transformative learning, therefore, is necessary to support sustainability learning; however, it is hard to achieve and does not necessarily occur in the best of circumstances.

Transformative learning is often linked with action, and is seen to be supported by experiential and active learning approaches (Kasworm & Bowles, 2012). Experiential learning is traditionally linked with sustainability learning (Cotton, et al., 2007). Real and authentic learning environments provide opportunities to reflect on experience, giving learners new understandings and insights (Beard & Wilson, 2006; Dawe et al., 2005). Where the action is a disorienting event that prompts critical reflection, change in practice or “reflective action” will result; if not, “non-reflective action” will result (Mezirow, 1991, pp. 106–107). Disorienting events, and subsequently transformation, can arise from action and can also promote action, encouraging experiential learning activities to support transformative learning (Taylor, 2008).

To engage in transformative learning Cranton (2006) argues learners must be empowered and supported. Empowerment means learners choose to participate in the learning experience, are free to reach their own understandings and are able to act on these new understandings (Cranton, 2006). McGonigal (2005, p. 1) recommends the following learning strategy to promote transformative learning through reflexivity, specifically:

1. an activating event that exposes the limitations of a [learner’s] current knowledge/approach;
2. opportunities for the [learner] to identify and articulate the underlying assumptions in the [learner’s] current knowledge/approach;

3. critical self-reflection as the [learner] considers where these underlying assumptions came from, how these assumptions influenced or limited understanding;
4. critical discourse with other [learners] and the instructor as the group examines alternative ideas and approaches;
5. opportunities to test and apply new perspectives.

Such support for learning is provided through the learning environment. Moon's (2004) conditions include a learning environment that provides time and space to reflect, facilitation to guide and support reflection, and a curriculum or program to frame reflection, as well as being emotionally supportive. Providing a clear and goal-oriented program frames the purpose of reflection that is enabled by authentic tasks to generate the context of reflection. Learners are challenged to reflect with unstructured tasks needing complex reasoning to address messy problems. Such a learning environment is one that exposes the learner to disorienting events and creates an opportunity and purpose to reflect upon these.

Most significantly, transformative learning is voluntary: a person cannot be forced to critically reflect (Cranton, 2009). Therefore, transformative learning approaches involve understanding and supporting learning motivation. Learners are motivated to engage in learning because the learning is valued and the learning is viewed as achievable (Biggs, 2003b). Further, learners report "provisional wholeness", an affirming emotional response that reinforces the new understanding (Moon, 1999, p. 132). How learning is valued can be described on a motivational orientations continuum from intrinsic to extrinsic reasons, where intrinsic motivation tends to support deep and extrinsic learning (Biggs, 2003b). For instance, Clune (2011) found students are more likely to engage in sustainability learning when they see it as vocationally relevant rather than a moral obligation. Such a finding reinforces the significance of pedagogies that include a focus on teachers as role models (Dawe et al., 2005, p. 5) to "offer a credible and authoritative perspective on the realities of putting sustainability principles into practice".

In summary, the sustainability curriculum aims for transformation; thereby, transformative learning is seen as the most appropriate pedagogy to prepare learners to anticipate and consider alternative and multiple perspectives, examine and challenge their beliefs and attitudes, and be skilled and prepared to act in new ways. Sustainability-related curriculum

change efforts must account for the deep and critical pedagogical considerations inherent in this sustainability learning.

2.2.3 The sustainability curriculum

Australian universities have individualised institutional policies and guidelines for the development of curricula for academic programs. These generally include guidelines for identifying and validating what is to be taught and how it is to be taught, and include the content, the knowledge, skills and attitudes students will learn by the time they graduate, as well as the pedagogical considerations, program structure and sequencing of the learning. In part, these policies and guidelines are informed by federal and state government policy and frameworks such as the Australian Qualifications Framework (AQF) and graduate attributes, which are applied and contextualised by individual universities. A university's program development requirements are also significantly shaped by its own mission and learning and teaching strategies. These policies include procedures so the paradigmatic and pragmatic industry/professional knowledge, skills and attitudes requirements of the discipline/s of a given program are addressed.

As discussed, the UN has indicated that sustainability-related learning should be included in all formal curricula. In Australia, sustainability learning is not a formal requirement of every higher education curriculum. Decisions to include sustainability, in whatever form, in the curriculum are made by individual universities or because the discipline/profession deems it appropriate (Lang et al., 2006). For instance, some universities include sustainability or sustainability-related graduate attributes in their curriculum guidelines, but these are far from numerous (Lee, 2013). Further, in some programs, sustainability is considered inherently part of the discipline/profession, such as engineering generally as a requirement of professional accreditation, or fields like environmental science. The typical means of determining sustainability goals for a given professional curricula comes from consultations with industry and other stakeholders' groups (Hadgraft et al., 2004; Tilbury, 2004).

According to sustainability learning advocates, the curriculum cannot be amended for sustainability, but must be transformed (Huckle, 2004; Sterling, 2004b; Tilbury, 2004). Sterling (2004b) points out, however, that calls for sustainability-related curriculum change result in one of four responses. In order of increasing impact they are: (1) *no response*, characterised by no change to the curriculum; (2) *accommodation*, characterised by a veneer of sustainability applied to the existing curriculum; (3) *reformation*, characterised

by significant sustainability related content and some critique of existing world systems being integrated into the existing curriculum; and (4) *transformation*. Transformation is characterised by an entirely redesigned curriculum reflecting significant change in paradigm. It enables “... new meaning-making and examination of existing assumptions” (p. 55) necessary to respond to unsustainable practices, and is notably consistent with the aims of ESD itself. Notwithstanding this, Cotton, Bailey, Warren, and Bissell (2009) note the goals of reformation or transformation are challenging for academics to achieve, and point out the worth of “second best” solutions that make progress towards such goals.

Of course, calls for curriculum change in higher education are not new. Academics are likely to be involved in many curriculum change initiatives over their careers; it is part of the academic identity (Stefani, 2009). Academics are charged with the writing and subsequent teaching of the curriculum, in line with multiple stakeholder perspectives and expectations (Barnett & Coate, 2005). While many university and government policy makers shift their policies and curriculum development or graduate attribute frameworks to include sustainability, it is academics who negotiate the realities and implications of this in practice. Sustainability-related curriculum change shares the challenges of all types of curriculum change (Morgan & Roberts, 2002), but also has a number of specific challenges. Sterling (2004b, p. 58) argues that to achieve either curriculum reformation or transformation a “... critically reflective, adaptive response or second-order change” is required of academics, and in the case of transformation, a profound paradigm change in their belief systems is also required.

How sustainability is incorporated into the curriculum impacts on how students view and engage with sustainability learning, and a number of strategies have been used. These are summarised in Table 2.1.

Table 2.1: Strategies for Integrating Sustainability into the Higher Education Curriculum

Note: As summarised by Watson, Lozano, Noyes and Rodgers (2013, p. 107).

Horizontal approaches	Some coverage of particular environmental and/or social issues and material in an existing course.
	Sustainable development intertwined as a concept within pre-existing disciplinary-oriented courses, with the relevant sustainable development component issues matched to the nature of each specific course.
	Sustainable development offered as a specialisation or major within the framework of particular faculties or schools.
Vertical approach	A specific sustainable development course added to the curriculum.

First, the extent of integration into the structure of the curriculum ranges from not at all (Sterling, 2004b) to include single units, majors and holistically. Yet integration across the program, or at least within a number of core courses, better achieves the learning goals of raising students' awareness and understandings of sustainability within their contexts (Lozano & Lozano, 2014), consistent with the pedagogical approach discussed in the previous section. Similarly, graduate attributes are best taught as embedded into the curriculum holistically (Bath et al., 2004): "Generic skills are most effectively developed when they are embedded in curricula in ways that give them discipline-nuanced expression" (p. 326). Based on their experience of sustainability-related curriculum change, Duke and Kelly (2013) found stand-alone courses do not provide for the critical thinking and values examination necessary for sustainability learning, as such learning remains siloed with the course rather than seen as intrinsic to the program. Similarly, the relevance of sustainability learning for students is increased when they associate it as core to their vocation (Clune, 2011), and this is more likely when this is incorporated across the curriculum rather than as stand-alone courses. There are, however, few supporting examples of whole-of-program or major curriculum design generally (D'Agostino & O'Brien, 2010), with exceptions found in the literature relating to embedding graduate attributes providing some guidance through whole-of-program embedding such as the work of Bath et al. (2004).

The forms of sustainability addressed in the curriculum also impacts student learning. A broader, more integrative interpretation of sustainability within the curriculum supports deeper understanding of sustainability. Based on a survey of academic schools, Lozano (2010) found a narrow focus of sustainability – for example, the environmental dimension of sustainability – limited students' understandings of sustainability overall. Lozano (2010, p. 637) supports "... a transformation from compartmentalization, over-specialization, and reductionism towards more balanced, synergistic, trans-disciplinary, and holistic perspectives" to promote deeper sustainability learning.

In terms of framing the curriculum, all learning, including sustainability learning, in the higher education curriculum is best supported when learning goals or outcomes, learning activities and assessment are aligned and made explicit to students (Biggs & Tang, 2007b). In particular, in relation to graduate attributes, the assessment of learning acts as a driver for learning achievement (Hughes & Barrie, 2010; Radloff et al., 2008).

Examples where all of these curriculum elements are integrated into sustainability learning initiatives are not found in the literature. The literature provides many cases where individual academics have successfully embedded sustainability into their individual courses or set up stand-alone electives (see, e.g., Clune, 2011; Fredriksson & Persson, 2011; Hazelton & Haigh, 2008; Holdsworth et al., 2006; MacVaugh & Norton, 2012; Tilbury, Podger, & Reid, 2004). While worthwhile in themselves, initiatives such as these do not provide students with an integrative or holistic understanding of sustainability. Few cases of whole-of-program sustainability-related curriculum change in higher education have been reported to date. These few cases of sustainability-related curriculum change are in the fields of undergraduate civil engineering (Chau, 2007), postgraduate business (Benn & Dunphy, 2009), primary teacher education (Ferreira, Ryan, & Tilbury, 2007; Ferreira et al., 2009), and English language teacher education (Summers, 2010; Summers & Turner, 2011). The available cases focus on the change to the written curriculum and may also provide some student feedback on changes. The evaluation of these initiatives emphasise the process of curriculum change, the content, and perhaps consideration of pedagogy used. There are limited accounts of what could be called reformation or transformation reported. Studies that evaluate the impact of the curriculum change process by assessing student learning and capacity building among the academics involved and the broader community are difficult to find. Such studies are necessary, however, if we are to evaluate the contribution of genuine integrative approaches to curriculum change.

2.2.4 Barriers and obstacles to change

The literature describes a range of barriers and obstacles that inhibit higher education's ability to contribute to a more sustainable world. Wals and Blewitt (2012) see a need for academia to move beyond these barriers and obstacles in order to progress sustainability. It is worth considering these barriers and obstacles, particularly as they relate to embedding sustainability-related curriculum change in order to better develop appropriate responses. For instance, academics' views of the significance of sustainability in their discipline and curricula influence their engagement in curriculum change, so understanding this is important to inform curriculum change approaches and support (Cotton et al., 2007). Obstacles seen to create barriers to engagement in sustainability-related curriculum change include the following:

- understandings of sustainability;
- lack of an agreed definition for education for sustainability (Jones, Trier, & Richards, 2008);

- sustainability is seen as an abstract concept (Filho, 2000);
- sustainability is too broad a concept (Filho, 2000).

Value placed on or need for sustainability learning perceived as:

- no “scientific basis” to justify pursuing sustainability change (Leal Filho, 2000, p. 14);
- sustainability taking time from other parts of the curriculum (Jones et al., 2008);
- “understanding of why their engagement with sustainability education is important” (Holdsworth et al., 2006, p. 6);
- uncritical approaches. Drawing on research within schools, Dale and Newman (2005) see a significant barrier to integrating sustainable development literacy as unwillingness to examine existing literacies;
- “limited relevance of sustainable development to some disciplines” (Cotton et al., 2009, p. 724).

Challenges/lack of capability to bring the sustainability-related curriculum into realisation because of:

- uncertainty in embedding sustainability (Jones et al., 2008) and the shift in pedagogy required (Cotton, et al., 2009);
- an understanding of curriculum that has a focus on “content rather than pedagogy” that aligns with teacher-centred rather than learner-centred approaches (Jones et al., 2008, p. 348);
- (in)compatibility of sustainability with the discipline/program (Jones et al., 2008);
- difficulty in establishing stakeholder support for whole-of-program sustainability related curriculum change (Smith, p. ii, 2009)

Support for academics to bring about sustainability-related curriculum change is not available (Cotton, et al., 2009; Leal Filho, 2000) because of:

- lack of resources or resources cannot be justified (de la Harpe & Thomas, 2009; Leal Filho, 2000);
- lack of “time (acknowledged as part of their work) to pursue curriculum change” (Holdsworth et al., 2006, p. 6);
- lack of leadership from university senior management (Cotton et al., 2009; de la Harpe & Thomas, 2009).

Jones et al. (2008) point out a number of these obstacles reflect a narrow understanding of sustainability or an uncritical approach (Dale & Newman, 2005) and are largely

misconceptions (Leal Filho, 2000). Primary among the challenges, therefore, is the academics' struggle to interpret and relate the scope of sustainability and education for sustainability pedagogy to their curricula (Jones et al., 2008).

In reflecting on these perceived obstacles to sustainability-related curriculum change, Leal Filho argues they infer the “degree of receptivity” afforded by an individual’s background in relation to sustainability generally, hence “limiting relevance in University settings” (Leal Filho, 2000, p. 16). Given the barriers reported above and the variation in intentions to engage in sustainability-related curriculum change, it is unsurprising pragmatic and one-dimensional curriculum changes often result that would likely be described by Sterling (2004a, p. 55) as “accommodation” rather than the higher order “reformation” or even “transformation” necessary to embed sustainability. Wals and Blewitt (2012, p. 70) call on academics to

... reshape deeply entrenched routines, structures and practices by taking advantage of the privileged positions we have in our society. We need to confront our own assumptions and probably stand outside our systems to gain a clearer view of how this necessary change can occur.

Different understandings of sustainability learning exist for both academics (Clugston & Calder, 1999; Reid & Petocz, 2006) and others (Leal Filho, 2000). Reid and Petocz (2006) found academics teaching sustainability-related topics were found to have one of three understandings of sustainability and used teaching approaches consistent with their understanding of sustainability. The three conceptions of sustainability are Distance, Resources, and Justice.

Distance conception: “Sustainability is approached via a definition (maybe a dictionary definition of ‘keeping something going’ but essentially to keep the concept at a distance and avoid engagement with it”.

Resources conception: “Sustainability is approached by focussing on various resources, either material (minerals, water, soil), or biological (fish, crops), or human (minority languages, populations, economies)”.

Justice conception: “Sustainability is approached by focussing on the notion of ‘fairness’ from one generation to the following one, or even within one generation. The idea is that sustainability can essentially only happen under these conditions” (Reid & Petocz, 2006, pp. 116–117).

This diversity extends to academics' personal and varying perspectives on sustainability. Reid and Petocz conclude progressing the sustainability-learning agenda must include efforts to understand and develop how academics view sustainability.

Similarly, how academics view sustainability as relevant to their teaching and its location within the curriculum may vary. Academics' view the appropriate location of graduate attributes within the curriculum differently and this is likely to extend to sustainability learning. Table 2.2 presents the different conceptions of graduate attributes held by academics, as identified by Barrie (2006). These lie on a continuum ranging from not requiring being taught to deeply embedded and contextualised within the curriculum as an expression of a critical worldview. This variation resonates with different ways sustainability learning has been incorporated into the curriculum as discussed above. A precursor or complementary view of graduate attributes is likely to significantly challenge an academic's engagement in sustainability-related curriculum change.

Table 2.2: Academics' Conceptions of Graduate Attributes and Associated Teaching Approach.

Note: Adapted from (Barrie, 2006).

	Conception of graduate attributes	Graduate attribute teaching approach
Pre-cursor view of GAs	The basic skills and abilities which students are expected to have when they commence their studies.	Not required to be taught, as students arrive with these.
Complementary view of GAs	The useful skills and abilities students need which help them with their studies.	Taught as an add-on. Students could attend generic classes to learn these graduate attributes.
Translating view of GAs	The skills and abilities students need to be able to engage with the discipline learning.	Taught within the discipline context, by academics that are of the discipline.
Enabling view of GAs	The skills and abilities that assist students to see the world differently.	Taught as an integral part of the discipline knowledge.

In order to bring about sustainability-learning curriculum change, therefore, a range of skills and competences are recommended for academics, which may be supported by professional learning. These include the sustainability learning skills, attributes and competences identified earlier in the chapter; for instance:

- systemic thinking skills (Ferreira et al., 2009);
- action research skills (Ferreira et al., 2009);
- knowledge of education for sustainability (Ferreira et al., 2009; Lozano, 2006);

- organisational change skills (Ferreira et al., 2009);
- leadership skills (Ferreira et al., 2009).

Learning and teaching capability is also required of academics. Such capability includes:

- understandings of sustainability and its relevance to academics' disciplines (Holdsworth et al., 2009; Tilbury et al., 2004);
- strategic thinking that encourages academics to explore their understandings of sustainability and the relevance and need for sustainability learning within their teaching and disciplines (Tilbury et al., 2004);
- course design and writing skills (Ferreira et al., 2009)

Yet, academics can resist efforts to engage them in professional learning for a range of reasons (Elton, 2003). Approaches to support academics to be involved in curriculum change must be developed that acknowledge these barriers, as well as those specific to sustainability learning, and respond appropriately to mitigate resistance and foster genuine engagement in change. Peseta and Manathunga (2007) identify barriers to engagement in academic development as including:

- academics' teacher-focussed views of teaching impacting the academic development task;
- a focus on student learning challenges academics' perceptions of discipline-based pedagogies;
- teaching is undervalued within the university community;
- academics may "see themselves primarily as researchers rather than teachers" (p. 170);
- a perception that good teachers are not good researchers;
- finding educational theory and research frustrating;
- existing and valued teaching and learning approaches are not recognised and valued within the academic development project;
- academics perceive academic developers as prioritising university learning and teaching agendas; that is, academic developer approach academics with the positivist perspective described above.

It is, therefore, understandable that many academics report difficulties in engaging with sustainability curriculum change. Calls for curriculum change result in a range of responses; going from complete denial to wholesale reform (de la Harpe & Thomas, 2009; Holdsworth et al., 2006; Sterling, 2004a). Consequently, there is acceptance of second-best solutions to curriculum change (Cotton, et al., 2009). Addressing barriers and promoting

change includes the provision of appropriate professional learning for academics involved in developing and teaching sustainability learning within the curriculum (Barth & Rieckmann, 2012; Cranton, 2009; de la Harpe & Thomas, 2009). This involves “[b]uilding capacity for change amongst academics to engage in sustainability curriculum change” (Ferreira et al., 2009, p. 1) as well as “confidence to introduce concepts of sustainability as part of the work” (Leal Filho, 2000, p. 17). In support of change, university leaders and academics increasingly recognise the need for and are becoming more accepting of professional learning to support curriculum change for sustainability (Holdsworth et al., 2008; Lotz-Sisitka et al., 2007). Addressing obstacles relating to academics’ perspectives and motivations (Jones et al., 2008), requires well managed and thoughtful responses where academics are supported and encouraged to identify, challenge and reconsider their existing approaches to teaching sustainability in order to move past these obstacles. Dedicated academic development approaches that genuinely foster engagement, as opposed to alienating or disempowering academics from participation, are seen as assisting sustainability curriculum change (Tilbury, 2001). The next section explores the academic development literature, identifying the fundamental aspects of professional learning to support the lasting change needed to embed sustainability into the curriculum.

2.3 Academic Development

To address the issue of lack of progress and to assist academics with curriculum change generally, many universities look to academic development. An exploration of the academic development literature offers higher education leaders and academics approaches for designing appropriate professional learning to engage academics and support sustainability-related curriculum change.

Academic development seeks to affect student learning improvement using learning development approaches in universities (Beaty & Cousin, 2003; Blackmore, et al., 2004; Elton, 2003; Hicks, 2005; Land, 2001; Macdonald, 2003; Peseta & Manathunga, 2007; Webb, 1996). Academic development is seen as both the practice and study of higher education from within a range of disciplines (Macdonald, 2003) with multiple theoretical perspectives (Tight, 2004), or as a discrete discipline itself (Brew, 2003; Harland & Staniforth, 2003), albeit a relatively new and complex discipline with a developing theoretical framework (Brew, 2003; Healey & Jenkins, 2003; Lee & McWilliam, 2008). Academic development draws variously on a number of fields, including adult learning pedagogy and instructional design, as well as organisational development and change to

inform strategies for working with academics. Those engaged in academic development practice and research (academic developers), work in “teaching and learning, leadership, administration, and policy in higher education” (Blackmore et al., 2004, p. 19; Lee & McWilliam, 2008), and as organisational insiders (Brew, 2003, p. 167). Working with academics is a major focus of academic development “... encouraging academics to take up the mantle of change toward a teaching practice that is at the very least characterised by reflection, research, scholarship, professionalism and above all, a commitment to the modes and philosophies of student-centred learning” (Brew, 2003, p. 166). Student-centred learning is deep learning, learning for understanding, rather than teacher-centred learning, which tends to result in surface learning (Biggs, 2003b). For Hubball and Gold (2007) “... scholarly approaches to curriculum practice are key for understanding student learning; for developing flexible, responsive, cohesive and integrated curricula; and for assessing whether and how curriculum learning experiences are effective at specific stages and in specific circumstances” (p. 10).

The context for academic development is both cultural and operational (Becher & Trowler, 2001). University learning and teaching strategic plans and policies, informed by external agencies (Wisker, Watkins, Forgan, & Hughes, 2002) and the standing, funding, naming and organisation of academic development (Blackmore, et al., 2004) create a dynamic context for academic development work. In more recent times, academic development has shifted to more prescribed priorities. Clegg, Rowland, Mann, Davidson, and Clifford (2005, pp. 31–32) argue that external agencies and internal management have targeted “poor quality of teaching” requiring academic development approaches focussed on “certainty, measures and prediction and funding tied to political agendas”, along with calls for formal professional learning for academics to ensure teaching professionalism (Elton, 2006).

Broadly speaking, academic development is the leadership of, support for and facilitation of change initiatives associated with learning and teaching practice, including changes to the curriculum (Blackmore et al., 2004). Approaches to academic development efforts are varied and range from using holistic approaches to isolated efforts reflecting different perspectives on the purpose and practice of the work (Blackmore et al., 2004).

2.3.1 Perspectives on academic development

Academic developer views of “development” are underpinned by the epistemological perspectives they apply to the specific academic development task and reflects the way

they undertake their role and interact with others (Land, 2003, 1996). Webb (1996) identifies a number of perspectives, including positivism, hermeneutics and critical theory, each with its own key assumptions, limitations and strengths. The perspective used ideally matches the needs of the situation: the goals, the circumstances and context of the academic development task (Webb, 1996). Three perspectives are summarised below.

The positivist perspective: A positivist perspective attributes the academic developer with the expertise that participants need to replicate (1996). This suggests a deficit model of academic development, referred to above, attempting to “fix” the work of the academic, ensuring compliance with academic policy (Clegg et al., 2005). Such generic and literal approaches tend to result in surface learning rather than transformative change (Rowland, 2003). For instance, Blewitt (2005, p. 183) found a sustainability curriculum change project approach that is overly prescriptive at the outset can limit professional learning, by failing to “develop and sustain reflexivity”. This deficit approach implicitly undermines relationships between academics and academic developers (Clegg et al., 2005; Peseta & Manathunga, 2007); a relationship that is the key to academic development success (Webb, 1996). In contrast, open-ended approaches to professional learning to sustainability-related curriculum change are needed (Blewitt, 2005).

The interpretivist perspective: The interpretivist view sees the academic’s worldview as shaped by personal experiences and prevailing societal views (Webb, 1996), requiring a relational model of academic development (Trigwell, 2003). An individual’s worldview and conceptual framework is their personal and unique view of the world: their beliefs. Academics have a range of different understandings of curriculum (Barnett & Coate, 2005; Fraser & Bosanquet, 2006) and other aspects relating to sustainability curriculum change. Variations have been observed in academics’ understandings of graduate attributes (Barrie, 2006), pedagogical understandings and practice (Biggs & Tang, 2007b; Kember & Kwan, 2000), conceptions of teaching that impact on student learning (Ramsden, 1992; Trigwell & Prosser, 1997; Trigwell, Prosser, & Waterhouse, 1999), as well as unique paradigmatic contexts across the disciplines (Healey & Jenkins, 2003) and sustainability (Reid & Petocz, 2006). Academic development, therefore, is more likely to succeed when a range of attitudes toward change exist and when these influence engagement in change (Angelo, 1999; Eckel & Kezar, 2003; Gerber, 1996). Approaches that acknowledge and work with the diversity of perceptions and practices among academics are required to redefine the higher education curriculum to account for all the aspects that characterise a sustainability

curriculum outlined above (Adams, 2004; Wals, 2010a). The conceptual framework, therefore, is the academic developer's "source of engagement" (Fry et al., 2005, p. 60).

Relationships that foster learning are seen to arise from a culture of engaged dialogic and mutual learning. Wals and Blewitt (2012, p. 64), for instance, cite the case of African universities working in sustainability learning needing to find their own interpretations and approaches through engagement in a critical and collaborative process located in their own particular historical and political context, rather than "adoption of institutional rhetoric on sustainable development". Listening by academic developers enhances engagement with academics to build and validate shared meaning in relation to learning and teaching. The views of academics mutually inform and enlighten the academic developer's own views and practice. How academics see themselves as teachers and professionals influences how they approach their teaching and other work (Warhurst, 2006).

Yet, strongly espoused support from academics for sustainability-related pedagogy is difficult to achieve (Sterling, 2004b) and when applied does not necessarily translate into practice and action (Qablan, Al-Ruz, Khasawneh, & Al-Omari, 2009). Additionally, academics' intention or receptivity to act on sustainability curriculum change may not always result in lasting change. Whether sustainability learning is included in the curriculum and taught relies on academics being both willing and able to do so (Barth & Rieckmann, 2012). It is this issue that the critical perspective addresses.

The critical perspective: The critical perspective seeks to bring about action or change to address political imbalance, recognising an individual's worldview as the point of engagement (Webb, 1996). This perspective acknowledges "[c]hange involves ambiguity, ambivalence and uncertainty about the meaning of change. Effective implementation is a process of clarification" (Robson, 2002, p. 220). Academics are supported to achieve self-efficacy and action by questioning and changing their professional identity and practice through a process of critical reflection (Fletcher & Zuber-Skerritt, 2008). Consequently, academics' learning and teaching development positively impacts their capacity to engage in further change (Crawford, 2010). Employing the critical perspective in professional learning initiatives they offered, Fletcher and Zuber-Skerritt (2008) found participants changed transformatively, developing new and enduring insights and approaches. Participants changed their "perceptions of themselves as teachers, students or researchers" such that "[t]hree months after the workshop program, they commented on their renewed

energies, willingness to ‘have a go’, and confidence in moving forward in their work or studies” (Fletcher & Zuber-Skerritt, 2008, p. 85).

Within the critical perspective, it is important to maintain a critique of universities (Rowland, 2003). Within the critical perspective, academic developers act as “moral change agents” seeking “... to make a difference in the lives of students ...” and “...to address broader societal problems and issues that making a difference is literally to make changes that matter” (Blackmore et al., 2004, pp. 16–25). Here, the academic developer role includes questioning the purpose and practice of their work. Arguably, consistent with the goals of sustainability learning, there is an “emancipatory interest” to “show people how they are oppressed, how their interests have become repressed or distorted, and what life will look like when they have confronted their oppressions, changed their conditions and moved towards a more rational society” (Webb, 1996, p.63). In the absence of such critique, however, academic developers may be seen as complicit in management agendas rather than the needs of academics, creating negative, instrumentalist perceptions of academic development among academics (Clegg et al., 2005; Clegg, 2009; Ryan, Fraser, Bryant, & Radloff, 2004) and potential conflicts of interest (Hicks, 2005; Macdonald, 2003) leading to academic resistance, often in the forms of avoidance, refusal and/or qualified compliance (Anderson, 2008).

An evidence-based approach to critical academic development is necessary to support critique. Evidence informs and supports evaluating the impact of the work, rather than practice-based research alone (Cranton & King, 2003; Gosling, 2003; Macdonald, 2003). The academic developer is a “partner or colleague working towards the understanding of a situation or resolution of a problem” (Macdonald, 2003, p. 4). When the intentions of academic development support are clear to academics, they feel more empowered and free to make choices and decisions about their involvement, which are necessary for academics to take ownership of their curriculum (Kirk & MacDonald, 2001).

In summary, educational change is a form of social change and is therefore inherently complex (Yorke, 2002). Unlike the positivist approach that uses theoretical or generic practice-based training and privileges the views of the academic developer, the critical perspective necessarily applies locally contextualised approaches to achieve the critical learning required to bring about lasting educational change (Rowland, 2003). For instance, providing just-in-time support to solve “educational problems” rather than didactic “staff development for pedagogy” (Macdonald, 2003, p. 3). Localised approaches to academic

development encourage sense making relevant to the context and cross-discipline approaches support engagement, ownership, critique and empowerment among academics and are needed to develop new pedagogical approaches among academics (Fraser, 2006; Grace, Smith, Bradford, & Elvidge, 2004). Webster-Wright (2009) sees the distinction across the paradigmatic spectrum of academic development as “a shift in discourse and focus from delivering and evaluating professional development programs to understanding and supporting authentic professional learning” (p. 702).

Based on the above, a critical perspective that is non-prescriptive, localised, action oriented, questioning, and based on learning involving meaning making would seem the most appropriate academic development approach to promote academics to engage in sustainability-related curriculum change. The next section considers the fundamental aspects of such an academic development approach to promote professional learning.

2.3.2 Academic development to support sustainability curriculum change

This section draws on the academic development literature further and relates it to the professional learning needs of academics to assist academics in bring about sustainability-related curriculum change. The following eight fundamentals or principles provide an academic development approach underpinned by a critical perspective to support sustainability curriculum change. Employed together, the fundamentals create the holistic (Dirkx, 2006) and empowering adult learning environment necessary to engage in transformative learning and change (Cranton, 2006).

1. Top-down and bottom-up leadership support is fundamental.

A model for bringing about change requires two levels of leadership: leadership from change managers (top-down) as well as leadership among those required to change (bottom-up) (Kotter, 1995; Southwell & Morgan, 2009). Kotter (2001) describes leadership as a process of responding to the need for change by providing the vision and the communication to shape the change. Southwell and Morgan (2009) found “[l]eadership does contribute to student learning in context. How leadership is experienced can have an effect on teachers’ [academics] sense of efficacy and their teaching practices ...” (p. 2).

Leadership support from the top is required for engagement in curriculum change generally (Barnett & Coate, 2005) and creates the conditions necessary to support professional learning (Blackmore & Blackwell, 2006). Sound organisational policy frameworks and positive support and change efforts from leaders, including a pro-sustainability culture and

sustainability oriented policies, practices and values within the university and department have been shown to promote and influence deep and significant curriculum change generally (Fraser, 2006; Knight, 2001; Ryan et al., 2004) and for sustainability-related curriculum change specifically (Arbuthnott, 2009; Ferrer-Balas et al., 2008). In addition, university leaders' valuing and support of academic development is known to influence the way academic development is viewed by academics (Blackmore et al., 2005, p. 24; Brew, 2003; Ryan et al., 2005) and subsequently impacts academics' engagement in (Ryan et al., 2004) or resistance to (Peseta & Manathunga, 2007; Ryan et al., 2004) academic development and their support of curriculum change (Cowan, George, & Pinheiro-Torres, 2004).

Bottom-up leadership relates to distributed and localised informal leadership within groups of academics that tends to be transformational. This approach aligns with the notion of academics' loyalty to their discipline first, and the institution second (Elton, 2003). Southwell and Morgan (2009) identify this leadership as significant to "... teachers' instructional work and students' learning ... [such that] distributed leadership can enhance school culture and contribute to capacity building within schools and thus to school improvement" (p. 2). Here change is first achieved in local practice and may lead to change in policy within the organisation (Southwell et al., 2005). D'Agostino and O'Brien (2010) emphasise the significance of the distributed form of leadership as crucial to curriculum change as it accounts for the complexity of notions of curriculum and learning and teaching by providing a space for "... negotiation about issues which are themselves negotiable, rather than settled, even "as a matter of theory"" (p. 7).

The actions of individuals are able to shape university responses in relation to sustainability (Dunphy, Griffiths, & Benn, 2003). "Bottom-up" efforts can achieve change and influence greater support from the "top", despite lacking resources and facing other obstacles (Lang et al., 2006; Moore, 2004). For example, Benn and Dunphy (2009) undertook an incremental, local approach to enact sustainability curriculum change in the context of university espousal from change, but in the absence management support.

Further, academics engage in learning and teaching change for structural/contextual (institutional) as well as agentic (personal) reasons (Crawford, 2010, p. 198; Smyth, 1999), particularly in relation to graduate attribute related curriculum change (de la Harpe et al., 2009) and similarly in sustainability-related curriculum change (Jones et al., 2008). It is not always possible to isolate these two sets of reasons; hence, leadership in both forms need to

be considered singularly and dialectically to identify the impact of these in relation to achieving change in universities (Lines, 2005). Consequently, there is a need for academic developers to be supported to work across and both up and down the university (Macdonald, 2003).

2.Transformative professional learning approaches are fundamental.

As referred to earlier, the sustainability curriculum requires paradigmatic changes in thinking to move beyond mainstreamed unsustainable practices (Cranton, 2009). Holdsworth et al. (2008, p. 136) advise:

[s]ustainability capabilities will only be embedded into curriculum as part of a long lasting cultural change program, with a strong focus on well-structured programs that allow for rigorous debate, discussion, sharing and learning in safe spaces within the academic community of universities.

Academics come to their teaching roles with their perspectives on teaching developed from past experiences (Cranton & King, 2003). Structural influences such as rigid school boundaries and discipline “silos” can impact negatively on the agency and perspectives of participants (Ashwin, 2008; Becher & Trowler, 2001, p. 37; Carr & Kemmis, 1986). Engaging in sustainability-related curriculum change therefore requires academics to critique their often deeply held beliefs about their discipline. Critiquing the discipline opens the possibility for academics to explore the relevance of and inclusion of sustainability in their discipline (and programs) where sustainability has not traditionally been included. Similarly, to enact the learning pedagogies seen as supporting sustainability learning discussed earlier in the chapter is likely to involve academics in reconsidering their learning approaches as well.

A transformative learning approach (described earlier in the chapter) is well suited to adult learning (Cranton, 2006) and in particular to academics’ professional learning contexts (Cranton, 1994; Moon 1999) as it gives “... new perspective on our goals, what we do in our practice, and how we think about our [educational] work” (Cranton & King, 2003, p. 36). Given that deep curriculum and learning and teaching-related changes are complex, using a transformative learning approach allows “... decisions ... to evolve while new insights are created during the actual change process” (Lueddeke, 1999, p. 247), resulting in an “embedding of developed practice” as there is a continued effect arising from the transformational project (Yorke, 2002, p. 198).

Approaches to sustainability-related curriculum change therefore must involve engaging academics in transformative learning experiences (Moore, 2005; Sterling, 2004a, 2004b). Such an approach creates learning “... experiences from which people can extract and develop their own meaning from the world around them” rather than prescribing or privileging certain beliefs and attitudes relating to sustainability education (Holdsworth et al., 2008, p. 135) and its relevance to a given discipline.

Transformative professional learning for teachers involves creating a learning environment where “educators are led to examine their practice critically and thereby acquire alternative ways of understanding what they do” (Cranton & King, p. 32) and often follows a “disorienting event” (Cranton, 2009, p. 61). Change in professional practice occurs when critical reflection renders existing practices as untenable; usually occurring over an extended period rather than as a one-off event (Cranton, 2009). Providing professional development that promotes transformative learning can support academics to work towards the holistic curriculum associated with embedding sustainability in the curriculum.

Consistent with the earlier discussion on transformative learning, in their study, Barth and Reickmann (2012, p. 32) found professional learning to support academics to teach sustainability learning includes “(1) perturbation; (2) raising awareness; (3) opportunities for reflection; (4) learning-by doing”. These aspects align with transformative learning approaches that refer to experiential learning and critical reflection creating dissonance and leading to change. Opportunities to reflect are important because transformative learning in academic development arises from academics experiencing and reflecting on critical events (Fletcher & Zuber-Skerritt, 2008); that is, reflective practice (Beatty, 1998). Warhurst (2006) demonstrated reflection can occur in training programs; however, as referred to above, extended, project-based learning is most likely to promote and support reflection (see, e.g., Norton, Richardson, Hartley, Newstead, & Mayes, 2005). Transformative learning environments for academics also include monitoring and reflecting on progress over time with a scholarly approach, highlighting the need to collect appropriate data in order to track progress (de la Harpe & Thomas, 2009).

3. Understanding the context is fundamental.

Each curriculum change project has its own context shaped by organisational and discipline influences, as well as academics’ personal perspectives and prior knowledge and also the perspectives and knowledge of students. Contextualised approaches to academic development mitigate barriers to learning and maximise opportunities for success (Reid,

2002) as participants are more likely to see the tasks as relevant and useful, which enhances motivation (Fraser, 2006; Grace et al., 2004; Radloff, de la Harpe, & Wright, 2001; Reid & Petocz, 2006) that supports transformative change (Cranton, 2006). In relation to sustainability curriculum change specifically, Lotz-Sisitka et al. (2007, p. 170) found a need for “local adaption, and applications and reflexive engagement with change and issues in context, supporting a situated model of learning”.

Biggs identifies the teaching factors making up the curriculum change context (as opposed to student factors) as the objectives and assessment approaches, climate and ethos, teaching and institutional procedures (Biggs, 2003b). These also influence the professional learning context for academics. As discussed previously, the organisational context impacts curriculum change. The priority the university gives to a given curriculum change initiative, whether explicit or tacit, will influence academics engagement in such process (Blackmore et al., 2004). Further understandings of learning and teaching vary among academics, as do their prior learning and teaching experiences. Hence, the academic development approach is one that should be adapted to account for such influences (Ziegenfuss & Lawler, 2008).

As mentioned a significant part of the professional learning context is the discipline. Disciplinary differences matter in learning and teaching initiatives (Bath & Smith, 2004; Neumann, Parry, & Becher, 2002). Each discipline interprets the need for and practice of curriculum design and implementation in its own way (D’Agostino & O’Brien, 2010), including with respect to sustainability and the significance of sustainability’s place in the curriculum (Moore, 2004). Variations across disciplines exist, for instance, in the language to describe achievement and levels of learning (Moon, 1999; Ramsden, 1992), as well as epistemologies reflecting the nature of the “meaning of ‘evidence’ in education” (Morris & Fry, 2006, p. 54), as well as teaching approaches, requiring professional learning approaches that account for these differences in professional learning contexts (Reder, 2007, 2003).

4. Peer learning is fundamental.

Learning in peer groups is especially appropriate for academic development in support of curriculum change, since learning with and from peers contains many of the elements known to promote transformative learning (Cranton, 2006). Academics collaboratively socially construct meanings and learn from their professional practice (Cervero, 1992; Cowan et al., 2004; Holmberg et al., 2008), where in contrast, learning in isolation may not

necessarily test one's assumptions. Specifically in relation to sustainability, peer learning supports Barth and Rieckmann (2012) and Wals (2010b) call for social learning: "learning by mirroring one's own ideas, views, values, and perspectives with those of others" (p. 385).

In peer groups, collaboration on shared problems can be addressed, resulting in engagement and in authentic change (Barnett & Coate, 2005; Blackmore et al., 2004). It is here that academics report they experience "the most tangible, supportive culture for development" (Crawford, 2010, p. 195; Knight & Trowler, 2000) where "... newer members of academic staff, particularly those with fewer than 10 years' experience, described working with others as highly significant for their professional development" (Crawford, 2010, p. 197).

Transdisciplinary approaches, as a form of peer learning, are called for to enhance learning and teaching generally (Rowland, 2003) and sustainability learning curriculum change to promote transformative learning particularly (Moore, 2005). Examples of reported transdisciplinary professional learning initiatives in sustainability learning, however, using this approach provide mixed results. For instance, there are cases of transdisciplinary projects failing to gain traction, and evidence of long-term change (see, e.g., Holdsworth et al., 2009; Tilbury et al., 2004), while Barth and Reickmann (2012) report success. All three examples involve individual academics from different disciplines coming together and working to change their individual course curricula. In cases of whole-of-program curriculum change, however, working within disciplines in the first instance might have greater impact on change. Clugston and Calder (1999), in relation to sustainability learning, refer to the effectiveness of working within disciplines and how leadership within these is important for change. Similarly, Dale and Newman (2005, p. 358) found interdisciplinary approaches can create barriers to change for "those rooted in traditional disciplines. There is a tendency for practitioners to retreat back to a single discipline". This suggests that while not ideal, a more appropriate starting place for change and professional learning is within the discipline.

In addition, discipline-based peer groups afford the forming of a shared identity and allegiance through the common culture of the discipline (Healey & Jenkins, 2003). According to Knight and Trowler (2000, p. 81) the discipline-based department is the "... natural activity system of universities", thus, the discipline is well placed to support peer learning and collaboration and provide a learning experience that is authentic to the

realities of academia. Further, Wisker, Watkins, Forgan, and Hughes argue (2002, p. 1), discipline-based “learning and teaching oriented research groups” provide motivation for research and evaluation of teaching and learning initiatives. Discipline-based peer groups also share a common epistemology and conceptions of knowledge that can advantage academic development and allow deep and complex discipline-based problems to be explored (Healey & Jenkins, 2003), as long as transformative learning is supported. Further, “curriculum change is more likely to be significant and lasting if it grows out of a departmental consensus. This trend prevails because departments largely own the curriculum and are the seat of many budgetary decisions” (Roy, Borin, & Kustra, 2007, p. 22).

It would seem that while beneficial, working on learning and teaching in transdisciplinary groups needs to be managed and supported in timely ways (Elton, 2006). Fraser (2006) recommends the academic developer “...bring the various discourse communities together, to enable the genuine sharing of ideas and understandings” (pp. 9–10). Going further, Morris and Fry (2006, p. 54) propose using “education as the discipline of engagement” in such settings as a starting point to mediate transdisciplinary tensions and promote collaboration. To be consistent with a critical paradigm of academic development, such an approach would rely on reciprocity of learning between discipline academics and academic developers, where all are co-learners (Manathunga, 2006).

5. Allowing time is fundamental.

The provision of time for the curriculum change project is fundamental. “[R]eal change, due to its complexity, takes time” (Budge, Clarke, & de la Harpe, 2007, p. 8). For academic development support to be responsive to context, it needs to be situated within it, which requires taking time to understand the range of contextual issues and participants (Willcoxson, Wynder, & Laing, 2010). “Significant time is required to assist course coordinators in the initial mapping of courses, and in the compilation and analysis of the program map ...” (Willcoxson et al., 2010, p. 75). Further, as discussed earlier, allowing time promotes the transformative learning (Cranton, 2009). Southwell, Gannaway, Orrell, Chalmers and Abraham (2005, p. 41) found:

Time scales for achieving embedded change are very long. Many projects which were short term did not effect the same degree of change with the same degree of embeddedness as those with longer time-frames. In some instances, change was not

actually noticed until after a longer period, as the changes had been gradual and incremental.

6. Facilitation is fundamental.

It follows from the above discussion that a skilled facilitator is critical to the success of many sustainability curriculum change projects. Facilitation is found to both lead (Blackmore et al., 2004) and support (Crawford, 2010) academics' engagement in professional learning. Active facilitation is necessary to bring about the epistemic transformation required of sustainable learning (Sterling, 2010). Moon (1999) recommends the academic developer act as a facilitator to support academics as learners to critique and re-evaluate their frames of reference to ensure that tacitly held paradigmatic assumptions are "critically interrogated", a necessary element for transformation (Kreber, 2004, p. 43). A growing number of examples of facilitated sustainability-related curriculum change projects are found in the literature (see, e.g., Eisen & Barlett, 2006; Holdsworth et al., 2009; Wahr et al., 2013). Facilitation of a curriculum change project can have a significant effect on the outcome. For instance, the University of Plymouth used a series of facilitated workshops (Centre for Sustainable Futures, 2008; Dyer, Selby, & Chalkley, 2006). There is an emerging view that the success of many projects has relied upon a dedicated facilitation role, even if this is not made explicit and if group and collaborative learning makes the facilitation role less visible.

The choice of academic development orientation will "tend to produce different outcomes" (D'Andrea & Gosling, 2001, p. 67). Twelve orientations to academic development change practice have been identified (Land, 2001, 2003). These are referred to as (1) Managerial, (2) Political strategist (investor), (3) Entrepreneurial, (4) Romantic (ecological humanist), (5) Vigilant opportunist, (6) Researcher, (7) Professional competence, (8) Reflective practitioner, (9) Internal consultant, (10) Modeller-broker, (11) Interpretive – hermeneutic, and (12) Discipline-specific. A given orientation reflects the amalgam of "attitudes, knowledge, aims and action tendencies of academic developers in relation to the contexts and challenges of their practice" (Land, 2001, p. 4) and so is both dependent on the individual academic developer, who then responds to the facilitation needs or demands of the particular context in which s/he works. In identifying an appropriate orientation to use, therefore, Land (2001, p. 4) suggests mapping the orientations to "the organisational cultures and the needs and expectations of the differing stakeholder groups" and does this according to the nature of the desired change and change management theory. While these

multiple orientations exist, a key task is to ensure those with responsibility to facilitate this learning are clear about their roles and undertake these in such a way as to use appropriate approaches (Blackmore, et al., 2004). Of Land's (2001, p. 6) orientations, the two most aligned with the critical paradigm of academic development are the reflective practitioner and the interpretive-hermeneutic models: the Reflective Practitioner model "seeks to foster culture of self- or peer-evaluative, critical reflection amongst colleagues, to help them cope with uncertain and ambivalent organizational environments" and the Interpretive–Hermeneutic model uses a "dialectic approach of 'intelligent conversation' with colleagues in which balancing of different views, relation of local to wider perspective, part to whole, etc. leads to critical synthesis and production of new shared insights and practice". Both of these use peer approaches to promote meaning making, critical reflection and thinking in relation to academics practice in order to bring about change.

Willcoxson, Wynder, and Laing found "[t]he limitations of the [curriculum change] process are primarily related to the skills of the process facilitator ..." (2010, p. 75). A number of aspects of successful facilitation are identified.

The academic development facilitator needs to demonstrate learning and teaching expertise and scholarly expertise that increase credibility in the eyes of participant academics who, as scholar themselves, value such expertise (Blackmore et al., 2004; Cowan et al., 2004; Fletcher & Zuber-Skerritt, 2008; Reid & Petocz, 2003; Willcoxson et al., 2010). In addition, Reid and Petocz (2003) recommend facilitation that applies this expertise "to deconstruct the relationships between effective teaching and research processes in order [to] reconstitute them appropriately in different disciplinary contexts" (p. 115). For instance, the facilitator has a leadership role in interpreting and designing for learning and teaching change through context analysis (as discussed above); for example, using a SWOT (strengths, weaknesses, opportunities and threats) analysis or a needs analysis (Fletcher & Zuber-Skerritt, 2008; Yorke, 2002, p. 192).

A skilled facilitator contributes project management expertise through the ability to manage the learning project by promoting collaboration, participation and employing adaptive planning (Fletcher & Zuber-Skerritt, 2008) and acting as "cultural brokers" across learning contexts (Fraser, 2006, p. 9). "Good working relationships ... and the ability to manage group dynamics are also important, particularly in cases where interpersonal tensions exist or arise between those teaching on a program" (Willcoxson et al., 2010, p. 75). These facilitators are able to recognise and respond to the "in-between spaces"

(Mnguni & Long, 2006, p. 73) that describe the nature of the relationships within and the underlying culture of the group, which might emerge to characterise the context at a deeper level and that may reveal aspects significant to the curriculum change process and academic engagement that supports the learning and change environment. Facilitators need to be aware of and respond to the concerns and needs of participants as these impact on academics' willingness and capacity to engage (Crawford, 2010). Using learning-centred approaches, the facilitator responds to feedback (reflection in action and reflection on action) to support and capitalise on a transformative learning environment (Fletcher & Zuber-Skerritt, 2008) and to provide the just-in-time expertise so highly valued by participants (Cowan et al., 2004).

Embedded facilitation, where the academic developer works alongside academics as a participant and member of the project team, recognises and capitalises upon contextual situations, including pedagogical difference between disciplines (Rowland, 2003). Working alongside academics also supports academic developers.

A further key element in relation to the professional learning of teachers, refers to the need for "... 'skilled helpers' [who] must be special people, critical friends, trusted colleagues who have not only technical abilities but also human relating/interpersonal qualities and skills as well as time, energy and the practice of reflecting upon their own practice" (Day, 1993, p. 88). Adopting a "tentative" (Manathunga, 2006) approach (as opposed to a colonising approach) to academic development will include negotiation at its core. Consequently, Carew, Lefoe, Bell, and Armour (2008, p. 51) refer to the importance of "elastic practice" of academic developers, where "... multiple theoretical bases are melded or successively employed to support an adaptive, responsive approach to practice".

Finally, the facilitator's "commitment, values, and conviction concerning the content of the message" are key elements impacting engagement of academics (Fletcher & Zuber-Skerritt, 2008, p. 88). Supporting the development of meaningful and shared values among participants is necessary for leading learning and teaching change and requires additional qualities of the facilitator (Fullan, 2001). Facilitators need to be able to encourage debate between themselves and academics (Crawford, 2010), continually critique their own paradigms, assumptions and approaches, as well as "being attuned to the various manifestations and operations of resistance to teaching and learning practice" (Peseta & Manathunga, 2007, p. 167) and power relationships within the academic development

context (Webb, 1996). This is most important in exposing and redressing any uncritical and colonising attitudes held by the facilitator (Clegg, 2009; Manathunga, 2006).

7. Framing academic learning within curriculum change is fundamental.

Professional learning occurs within the context of professional practice (Fraser, 2006). That curriculum change is part of the academic identity has already been mentioned. Professional practice is the location of the development of professional identity. According to Dall’Alba (2004, p. 680):

[w]hen professionals enact or engage in practice, they intersubjectively constitute both the practice itself and the practice traditions that develop over time. Hence, practice is ... a dynamic flow produced and reproduced by professionals ... the way in which we understand professional practice is central to how we perform that practice.... More specifically, the knowledge and skills that make up professional practice are organized within particular understandings of that practice.

Change is embedded through active reinforcement (Elton, 2003). Eley (2006) suggests supporting academics to apply more developed understandings of teaching (i.e., learner-centred conceptions) to actual teaching events requires opportunities to “practice those specific ways in that particular context” (p. 211). Similarly, Argyris and Schön (1974, p. 14) see the need to “practice, to develop and draw on tacit knowledge, and to be in a learning situation that permits a reinforcing cycle of feeling and performance to begin”. A collaborative curriculum development project, therefore, is an authentic opportunity for academics to engage in professional learning to support their learning and teaching (Cranton & King, 2003). And most importantly, academics are able to apply and test their theories of teaching and to reflect and critique in-situ (Cranton & King, 2003); that is, experientially. Such projects allow academics to link theory and practice of sustainability, working in practical applications and promoting the value of sustainability (Leal Filho, 2000) and have been used successfully (see Lotz-Sisitka et al., 2007). Barth and Rieckmann (2012, p. 34) refer to the success of “learning-by-doing” to create “the strong link with teaching and learning practice” and fostering “participants’ commitment and increased their motivation to engage”.

Academics highly value academic development that focuses on curriculum design and is collaborative, authentic and anchored in changing practice (Ferman, 2002; Peseta & Manathunga, 2007; Reid, 2002). The learning context of the curriculum change project supports professional learning as it is a local, authentic approach (Elton, 2003; Nir &

Bogler, 2008) that is more effective than “isolated staff development activity” (Cowan et al., 2004, p. 441). Such an approach provides academics with flexibility to configure their own learning within a familiar context (Elton, 2003) and allows them to focus on their own practice in situ, enhances their “... pedagogical and strategic knowledge and their ability to work in a structured way” and promotes them to think more critically about learning and teaching (Ferman, 2002, p. 152). Indeed, Bester and de Graaff (2012) found the collaborative curriculum change project supported transformative learning as academics engage together to discuss and debate the strengths, gaps and framing of the existing curriculum and then must collaborate to re-envision and enact the new curriculum.

Hence, a holistic curriculum change process supports group ownership among academics as well as integrated and holistic learning across the curriculum for students (Dirkx, 2006). Holistic approaches recognise and value the complexity of a given learning environment (Jones et al., 2008; Joseph, 2010). The extent of ownership and influence a group of academics has of their curriculum therefore creates a conducive learning environment where there is “mutuality of responsibility in defining goals, planning and conducting activities based on the real needs of the participants” (Burns, 1995, p. 99).

8. Establishing relationships based on trust and mutual respect is fundamental.

The success of the academic development project has a strong dependence on the quality of the relationships between and among the academic developer and academics (Webb, 1996). To engage academics meaningfully, those involved in academic development activities must establish trusting relationships with academics by using value-based approaches (Gosling, 2003). Such approaches value and appreciate what each, as learners, brings to the curriculum change process. While the academic developer can act as a facilitator for change, bringing a different expertise to complement the disciplinary expertise of the academics involved (Reid, 2002), this must occur in the context of mutual respect and learning.

Such a focus on values is consistent with sustainability learning itself because a pedagogy for sustainability learning must engage with values and attitudes. Wals (2010a, p. 146) refers to the cultivation of “[p]luralism of thought (values, perspectives, ideas, etc.) ... as a mechanism for facilitating the kind of creativity and innovation that is needed to transition towards a more sustainable world”.

Educational change can be associated with feelings of loss and grieving (Fullan, 2001) and can be stressful for academics (Martin & Leuckenhause, 2005) for a number of reasons, highlighting a need for a sensitive approach, in order to support change. First, Morris and Fry (2006) note that “[m]oving into the field of education has turned international researchers into research novices in need of support and advice” (p. 54). Second, the collaborative curriculum change process makes what is often private more public and can create a sense of loss of control (Ziegenfuss & Lawler, 2008); “... each group is surrendering some of their own disciplinary power and identify in the effort to co-construct trans-cultural, inter-disciplinary, ‘new’ but always-contested ways of seeing teaching and learning” (Manathunga, 2006, p. 28). Next, transformative change generally can be “difficult and often uncomfortable for the learner” (Sterling, 2010, p. 23). And further, Kezar (2001, p. 121) highlights the need to create a “culture of risk” within universities to support change processes. Yet, trust and confidence are required to engage in risk taking.

Trusting relationships are therefore needed to provide emotional support to learners (Elton, 2003). Without trust and mutual respect, it is unlikely the conditions to support “[a]n individual who is insecure, lacking in confidence, anxious, or unsupported ... to overcome the emotional barriers to question values and assumptions” necessary for transformative learning to occur (Cranton, 2006, p. 133). The need for trust must be anticipated and responded to within change processes (Argyris, 1982). Academic development approaches engender trust between participants when the following core values are in place (Smyth, 2003, p. 57):

- making time to build strong trusting relationships with and between all involved;
- interaction based on mutual understanding rather than on controlling the learning environment;
- embracing negotiated rather than imposed collaboration;
- authentic rather than placatory consultation.

2.4 Chapter Conclusions

The above fundamentals promote an academic development approach where the curriculum change environment is characterised by understanding the change context, ensuring trust and mutual respect, transformative learning with peers and the support of a self-critical facilitator. Building relationships becomes the capstone fundamental in which each of these fundamentals is embedded. Each of the previous seven fundamentals either promotes or relies upon the building of relationships between all those involved in the

curriculum change. Strong relationships support the trust and respect necessary for transformative learning to occur. Understanding context provides insight and empathy so that the perspectives of others are valued, a necessary condition for collaborative peer learning and effective facilitation. Strong relationships allow academic developers and academics to work together to negotiate solutions to the tensions created by managerial expectations and the need for deep and lasting change. Building and maintaining strong relationships enables all involved to become “invested in the process of course design, implementation and outcomes” (Ziegenfuss & Lawler, 2008, p. 158). In doing so, individuals can feel more comfortable to try new approaches without fear of blame if things do not go to plan.

As this literature review has established, supporting academics with sustainability curriculum change should aim for transformative learning and lasting change to match the characteristics of sustainability learning itself. Such an approach needs to be situated in real world contexts and focussed on practice-based outcomes, where academics actively and collaboratively participate in authentic learning from and with one another in disciplinary homes. This approach also requires managing the fine balance between top-down support and locally owned and driven change. Most importantly, however, it relies on a highly skilled, self-critical, reflective, intuitive facilitator who is able to build relationships by understanding, valuing and working inside existing academic cultures to advance their interests, concerns and methods. In this chapter, I have argued for an approach that embodies these fundamentals and has the potential to contribute significantly to achieving academic development goals; and, when used to support curriculum change for sustainability, has the potential to result in long-lasting transformation on the ground.

The above fundamentals do not specify a particular step-by-step process; rather, they provide guidance for practice. The fundamentals require interpretation and local contextualisation that is seen as more likely to support successful project outcomes (Cebrián, Grace, & Humphris, 2013). I have developed the “embedded model” as a practical manifestation of the fundamentals. The embedded model is applied in this study with the aim of reviewing its contribution to sustainability-related curriculum change. In this study, therefore, action research is adopted as the research approach to achieve this aim. The underpinning theory and practices of action research, the embedded model and the alignment between them are discussed in detail in the next chapter.

Chapter 3: Research Design

3.1 Introduction and Overview of Chapter

The previous two chapters reviewed and presented the significant ideas, theories, practices and considerations relevant to the design and implementation of an academic development approach to support sustainability related curriculum change in an Australian university. The literatures of sustainability learning, curriculum change and academic development were reviewed. Based on this review, I identify the “embedded” model as a promising approach to support sustainability-related curriculum change. In this chapter, I present the research design (theoretical perspective, principles and practices) that guides and promotes the study of the embedded model through its application to a project to bring about sustainability-related curriculum change in the TD Program at RMIT.

The notion of “embeddedness” is used to inform the choice of the methodology for the study. This chapter introduces action research methodology and demonstrates its applicability to the study using the embedded model. Unlike conventional models of research in the social sciences, action research is challenging and ambitious in that it seeks to both advance understanding and bring about lasting change (Kemmis, McTaggart, & Nixon, 2014). The action research project involved a group of academics and myself, as project facilitator, working collaboratively for over 2½ years to bring about curriculum change, with the aim of embedding sustainability as a graduate attribute into their program. I outline how the data was collected, analysed and validated, as well as how the project has been evaluated. I discuss the limitations of the research design and implications for the findings.

3.2 A Methodology Reflecting Embeddedness

3.2.1 The embedded model

Chapter 2 highlighted the fundamental aspects of an academic development approach to support lasting sustainability curriculum change. These include transformative and peer learning approaches, a focus on context, provision of facilitation, and time. These are consistent with the nature and practice of sustainability and sustainability learning principles, as well as what is known from the academic development literature to promote deep and lasting change among academics in learning and teaching practice.

The fundamentals can be applied as disparate, stand-alone strategies. When applied collectively, however, the interconnections between the fundamentals become mutually reinforcing, creating a powerful system for change. Indeed, the fundamentals are largely codependent, meaning it would be difficult to enact one without others. For instance, peer learning relies on trusting relationships and local change that is supported by leadership. As an interconnected system, these fundamentals coalesce under the banner of “embedded”. Embedded here means fixed firmly and deeply as an integral part of a system (Baker & Henson, 2010); that is, built in rather than bolted on, and immersed rather than decontextualised (Dall’Alba & Barnacle, 2007). Further, it involves “... the engagement of the innovation in the local processes and perhaps the modification of policies, procedures and structures to accommodate the new practice” (Southwell et al., 2005, p. 20).

I use the notion of “embedded” to both frame and form a thread throughout the thesis. By identifying embeddedness as a recurring theme, the argument is made that an embedded curriculum change model offers the coherent and holistic approach to sustainability-related curriculum change recommended in the literature (Dawe et al., 2005; Tilbury, 2004). It is an approach that supports academics to change their program’s curriculum by engaging deeply with the concepts and practices of sustainability learning as these relate to their disciplines and professions. Thus, the chapter presents a supported curriculum change model based on embeddedness that promises to go a significant way towards engaging academics in real and lasting sustainability curriculum change. The implications for implementing the model are also briefly considered, with strong synergies between the embeddedness model and an action research methodology.

There is a nested synergy here between the goals of sustainability-related curriculum change and the approach used in this study. Promoting sustainability is the overarching learning goal through holistic curriculum change, which is in turn supported by an action research project. “Embedded” is the core organising concept for undertaking the study. While the study focusses on relatively discrete entities, namely a single program team of academics and the program they teach into, these are nonetheless embedded within a larger system, where both can mutually exert influence upon epistemic and practical knowledge and also practice across the system and over time. Moreover, in relation to the methodology used, how the action research principles are applied and evaluated is also characterised as embedded. The elements are interdependent and therefore the approach to undertaking the project is itself holistic.

The notion of embeddedness captures the aims of this project, of bringing about sustainability-related curriculum change such that it informs the intent, the process and the outcomes of the project. Embeddedness is threaded through the project in the following ways:

Embedded model Embedded model

Intent:

- deep and transformative change for academics (Lueddeke, 1999; Yorke, 2002p. 247);
- long-lasting impact of outcomes and benefits (Holdsworth et al., 2008; Rowland, 2003).

Process:

- professional learning approach is based on the need for critical reflection (Moore, 2005; Sterling, 2004b);
- scholarly approach adopted (Brew,2003);
- discipline perspective emphasised:
 - whole-of-program focus to curriculum change (Bath et al., 2004);
 - all of the program team involved (Cervero, 1992; Cowan et al., 2004; Holmberg et al., 2008);
 - participants encouraged to approach the work from within their existing discipline/professional lenses (Clugston and Calder,1999; Dale and Newman, 2005);
 - existing sustainability capacity within the program team and program recognised, celebrated and capitalised on rather than applying a deficit model of starting from scratch (Holdsworth, 2006);
 - engagement with a range of stakeholders within the university and industry and the program/discipline perspective promoted (Hadgraft et al., 2004; Tilbury, 2004).
- social learning within and beyond the group promoted (Barth and Rieckmann, 2012; Cervero, 1992; Cowan et al., 2004; Holmberg et al., 2008):
 - group workshops and activities the focus of professional learning (Macdonald, 2003);
 - multiple perspectives explored (Bester and de Graaff, 2012; Wals , 2010b);
 - collaborative problem solving enacted (Barnett & Coate, 2005; Blackmore et al., 2004);
 - action orientation applied (Sterling, 2004a; Tilbury & Cooke, 2005; Wals, 2010a);
 - reflection on action fostered (Fletcher & Zuber-Skerritt, 2008; Tilbury & Cooke, 2005).

- facilitation of the project provided (Reid & Petocz, 2003; Sterling, 2010):
 - facilitation and support provided within the professional practice context of the program team and the local teaching context (Fraser, 2006; Grace, Smith, Bradford, & Elvidge, 2004);
 - facilitation is anticipatory of and responsive to professional learning needs of the program team (Cranton, 2010).;
- project undertaken over an extended time period (Willcoxson et al., 2010);
- curriculum design underpinned by constructive alignment (Biggs & Tang, 2007a);
- sustainability learning taught, assessed and reviewed (Hughes & Barrie, 2010; Radloff et al., 2008).

Outcomes:

- project ownership and engagement in the project among academics established (Kirk & MacDonald, 2001);
- sustainability issues viewed as relevant within local and broader contexts (Tilbury et al., 2004);
- sustainability learning built into and aligned within the curriculum (Sterling, 2004a);
- links to other sustainability-related initiatives built (Department for the Environment, Water, Heritage and the Arts, 2009);
- academics integrate sustainability into their learning and teaching work and their research (Wisker, Watkins et al., 2002);
- cohesion strengthened within the group (Wisker, Watkins et al., 2002);
- reflective practice and self-awareness among participants enhanced (Yorke, 2002).

It is difficult to find examples in the literature of holistic approaches of sustainability-related curriculum change that successfully integrate all of these various elements relating to whole-of-program, academic development for participants as well as aligned sustainability learning within courses. Bath et al. (2004) identify many of these elements as supporting curriculum change to integrate graduate attributes through a whole-of-program change using evidence-based and action-learning approaches. Arkourdis (2014) recommends an approach that incorporates many elements of the embedded model to integrate English language communication skills into all higher education curricula. So, while similar approaches have been trialled in other areas of higher education, such an approach has not been tried in practice in relation to sustainability learning. The embedded

model might go some way towards providing the sort of transformative approaches especially called for to support professional learning in sustainability-related curriculum change; namely, approaches that are critically reflective, value and share multiple perspective and lead to new understandings and changed practices (Huckle, 2004; Sterling, 2004a; Wals, 2010a; Wals & Jickling, 2002). Addressing questions of how these elements are brought together in a single project, what this might look like in practice, and what results, is the contribution of the study.

As a context-based research methodology, action research is consistent with the study of the embedded model. Action research promotes academics to develop creative and reflexive responses to change curricula that are evidence based and scholarly (Hubball & Gold, 2007). The particular appropriateness of action research to sustainability-related research is demonstrated by its commitment to:

sustainability as a concept that takes shape and meaning by the active involvement of all relevant actors in a transparent and highly reflective process that is firmly rooted in the social realities of a given context, but sensitive to emergent realities in other contexts as well. (Corcoran, Walker, & Wals, 2004a, p. 9)

As such, action research is widely recommended for the purposes of researching and promoting sustainability curriculum change (Benn & Dunphy, 2009; Ferreira et al., 2009; Winter & Cotton, 2012). As shown below, some cases using action research share aspects of the embedded model promoted in this thesis, but none cover all.

All examples of individual courses (or subjects) undergoing sustainability-related curriculum change cited in Chapter 2 used an action research approach. In the case of Holdsworth et al. (2006) and Tilbury et al. (2004), the action research approach supported a group of academics from a range of disciplines and programs bringing about sustainability change in their individual courses. Both these studies had a strong emphasis on professional learning for the academics involved, using cycles of reflection and supported by facilitation. The other examples involved individual academics initiating and reporting on changes they have independently made to their individual courses. Considering the need for embedding sustainability across the program, however, the only three examples found in the available literature all use an action research methodology to study whole-of-program change, also discussed in Chapter 2.

Fien (2001) reports on another form of action research project associated with sustainability curriculum change. This was undertaken as a review of the professional learning outcomes achieved where education academics developed environmental education modules for use in teacher education. Participants discussed and provided feedback on experiences of their own action research projects. This meta-study explored personal professional learning, positive influences and other issues related to the process, recommendations for improving the process, and wider application of the process.

As mentioned in Chapter 2, evaluation is one important way in which this study departs from the example studies cited previously. These examples tend to use participant reflection on the process and experience of change from the perspectives of the academics and in some cases the experience of students. It has not been possible to find studies that critically evaluate the learning arising from the curriculum change. This is consistent with the findings of research into evaluating student learning arising from embedding graduate attributes (Bath et al., 2004), as well as the academics' professional learning where "most programme evaluations reflect only superficial levels of experience and let us only speculate about the cognitive, emotional and developmental experiences of programme participants" (Kreber & Brook, 2001, p. 98). Indeed, in relation to sustainability curriculum change, Desha and Hargroves (2014) emphasise the importance of monitoring and evaluating whole-of-program curriculum change, and the reporting of "tangible benefits" or impact, yet were unable to find suitable frameworks to evaluate their work, citing the complexities of sustainability skill and knowledge as problematic.

The embedded model has been developed to respond to the recognised interdependence of curriculum change and professional learning. Critically reflecting on both sustainability learning as well as learning and teaching theory and practice prompts and informs the professional learning of the group. Participants determine the forms of data needed to inform their practice in situ. By applying the embedded model within an action research method, thus involving longer project duration and the additional resource of the facilitator, undertaking valid and rigorous evaluation of the project is more possible. Most importantly, this creates the environment and evidence for the enduring, transformative change necessary to bring about the sustainability curriculum. This has not been reported in the literature previously in association with a professional learning approach to curriculum change. As such, the embedded model provides a framework for critically evaluating the impact of curriculum change.

3.2.2 Introducing action research

Action research is based on a cyclical process of planning, action, review and reflection. Action research can be undertaken according to a range of models that emphasise different aspects of participation and practice (Wahr & de la Harpe, in press). Based on a critical paradigm, action research aims to bring about lasting change through the involvement of participants in critical reflection and challenging their societal norms and assumptions as well as their practices (Kemmis & McTaggart, 2008). The action research methodology used in this study sits within a critical theoretical paradigm and draws heavily on the theories and practices suggested by Coghlan and Brannick (2010) and Townsend (2013) to bring about lasting change within organisations using action research.

Within critical research broadly, theorising relates to the context of the research, but is, nonetheless, capable of achieving generalisable findings. Kincheloe and McLaren see the theorisation of such studies as a process of dialectically relating the “whole to the parts and the parts to the whole” (Kincheloe & McLaren, 2002, p. 98). Action research, based on critical theory, therefore aims to transform both practice and theory (Kemmis & McTaggart, 2008; McNiff & Whitehead, 2010; Wadsworth, 2010). Practice is transformed as participants seek to improve their practice (Zuber-Skerritt & Fletcher, 2007), or develop practical judgement about their practice as they engage in action research cycles (Burns, 2000). Participants develop new theories of practice within their local contexts that, ideally, lead to changed and improved practice (McNiff & Whitehead, 2010).

In addition, reflection and critique within and upon the action research process and experience extends the theorising contribution to scientific knowledge and theory more broadly. This meta learning provides insights and new knowledge for understanding and addressing problems and issues in practice more generally (Coghlan & Brannick, 2010; Zuber-Skerritt & Perry, 2002). Action research contributes to theory development by providing cases that can reinforce or identify exceptions to existing theory; thus creating new knowledge (Greenwood & Levin, 2008).

The project reported in this study uses an action research methodology similar to the cases referred to above; however, it goes further than previous studies reported in the literature as action research is used as a methodological vehicle to study the application of the embedded model holistically. Figure 3.1, therefore, is a representation of the study. The study consists of the development of the embedded model, which is then related to action

research methodology. Together these are applied in the field as “the project”. The embedded model is then evaluated.

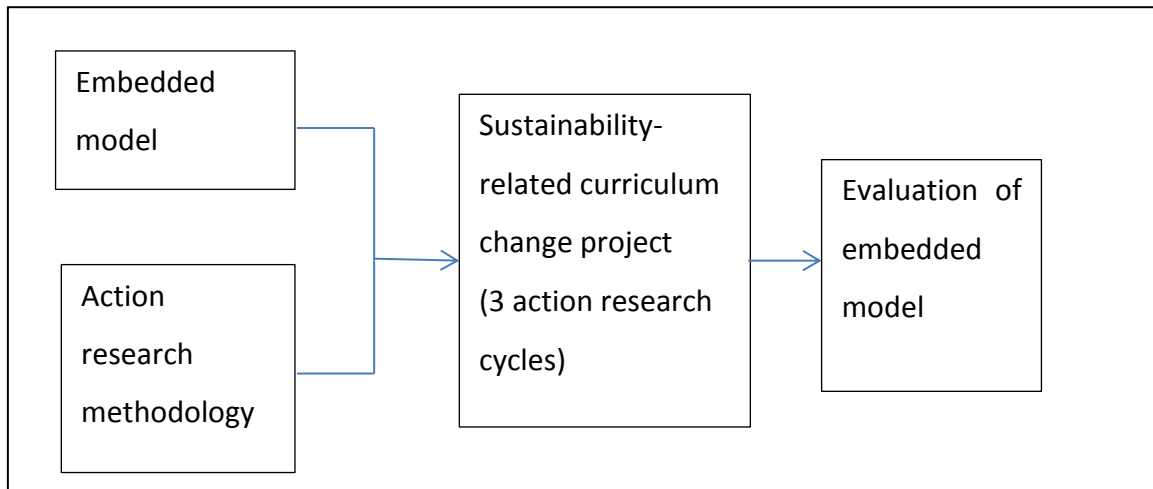


Figure 3.1: Representation of the study.

Together, the three action research cycles described in this thesis form the curriculum change project undertaken collaboratively by the group, comprising the academic participants and myself as action researcher/facilitator. Concurrently, I am the action researcher conducting the study as a whole (Coghlan & Brannick, 2010). A consistent framework of reflection and critique is applied to all aspects of the action research project in order to both contribute new knowledge as well as to improve my practice as a researcher and academic development practitioner.

3.3 The Principles and Practices of Action Research Used in This Study

This action research project is characterised by a set of principles and a complementary process and forms of practice that support the principles to be enacted. The process as experienced by participants is as important as the outcomes of the project, as participants need to be supported to develop skills and new insights by working through the cycles and the questions these throw up (Kember, 2002, p. 92). Primarily, the process involves engaging participants in a systematic project of action and reflection requiring particular attention to support such engagement.

Based on a synthesis of the literature, the principles of action research comprise the following:

1. addresses real, complex issues;
2. is critical;
3. is emergent;

4. involves learning;
5. is participatory;
6. is supported by external facilitation; and
7. emphasises the role of values in research practice.

I now expand on each of these principles and associated practices and relate them to the embedded model as applied in this study.

3.3.1 Action research addresses real, particular and complex issues

The impetus and focus of action research is the need to address, by enacting change, a local issue or problem (Zuber-Skerritt & Fletcher, 2007) or a situation arising within practice (Burns, 2000). These are local issues of the practitioner: real-life problems³ of practice in the workplace, in the classroom and in the community (Fletcher & Zuber-Skerritt, 2008, p. 76). These are important, non-trivial issues that can contribute to improving the lives of others (Zuber-Skerritt & Fletcher, 2007) through “social and cultural transformation” (McNiff & Whitehead, 2010, p. 20) by promoting “egalitarian and democratic aims” (Creswell, 2005, p. 556). These issues are messy, dynamic, and often found in complex contexts with multiple stakeholders and to which there is no single, obvious or simple solution (Kember, 2000). The complexity of actual social situations requires realistic and authentic responses (Wadsworth, 1998). Consistent with the embedded model in applying action research, “[n]o attempt is made to identify one factor and study its effects in isolation, divorced from the context that gives it meaning” (Burns, 2000, p. 449). Exploring and addressing these issues involves considering the specifics of the situation (Kemmis & McTaggart, 2008), hence action research is context specific (Burns, 2000). According to Corcoran et al. (2004a), this is particularly pertinent to researching sustainability related change as:

... we are particularly interested in the contextual development of sustainability ... sustainability as a concept that takes shape and meaning by the active involvement of all relevant actors in a transparent and highly reflective process that is firmly rooted in the social realities of a given context, but sensitive to emergent realities in other contexts as well. (p. 9)

Coghlan and Brannick (2010) refer to the “pre-step” of the action research, where the researcher first engages with the group, the issue and the context, in order to develop an

³ The term “issue” will be used from this point forward given the negative and, for the purposes of this study, inaccurate connotation of the term “problem” (Coghlan & Brannick, 2010).

understanding, in the broadest terms, of what the project is about and who it involves. This includes developing a preliminary understanding of the issue: the need for the project and an understanding of the relationships, politics, dynamics and practices within the organisation or community where the project will take place. Unlike first-order research that sets “pre-determined measures for expected outcomes”, second-order research aims to find out “what is important to those involved in the research and to evaluate why research might be meaningful to them” (Fletcher & Zuber-Skerritt, 2008, p. 75). Action research can be used in supporting professional learning in higher education as a “second-order [research] approach to evaluating and facilitating organisational change, learning and sustainable development” (Fletcher & Zuber-Skerritt, 2008, p. 75). The factors identified in Chapter 2 as inhibiting sustainability-related curriculum change are complex and relate to academics’ perceptions of the relevance and application of the sustainability curriculum and structural barriers relating to support and capability building, despite institutional calls for change.

Applying second-order research to the design of this project, I undertook steps to ensure I was bringing the group with me in the project. As action researcher I met with stakeholders and potential participants. I observed and heard about how sustainability was understood and represented within the School of Fashion and Textiles at RMIT, and specifically among the group of academics teaching the program that was to become the site of the curriculum change project, the TD Program. As I explained my research interests with a range of people, we also discussed possibilities for how such a project might unfold. In this way I developed a sense of the form of the issue that existed and identified the stakeholders who could influence change, and considered potential participants’ “readiness and capability for change” (Coghlan & Brannick, 2010, p. 68), as well as starting to build relationships and negotiate who and how participants might be involved in the project. I prepared a SWOT analysis from the data I collected to summarise my findings and present to the group (Wolf, 2007). Based loosely on the tenets of the embedded model, the SWOT analysis identified the strengths, weaknesses, opportunities and threats associated with undertaking the sustainability-related curriculum change project. The SWOT analysis was presented to the group to confirm and validate my interpretations of the context, to generate shared understanding within the group, and as an evidence-based approach for the group to develop a way forward (Segalàs, Ferrer-Balas, & Mulder, 2009; Zuber-Skerritt, 2002).

The curriculum change process would be integrated into the cycles based on the standard recognised steps based on curriculum alignment (Biggs & Tang, 2007b) – that of developing learning outcomes, designing assessment to evaluate students’ achievement of the learning outcomes, and designing a series of learning experiences to support students to achieve the learning outcome through the assessment. The process is broadly recognised and validated throughout the literature in relation to graduate attribute-related curriculum change.

Chapter 4 includes a description of the “pre-step” or context for the action research project in detail and presents the SWOT analysis and explains how it was used.

3.3.2 Action research is critical

Complex situations requiring transformative change necessitate close examination of the interpretations, underlying causes and factors that frame and contribute to the creation of those situations. Critical researchers see knowledge as interpretivist and socially constructed (Alvesson & Deetz, 2000). Rather than provide only description as the outcome of research, however, they seek to reveal the diversity of views and perspectives, such that the process of meaning making and interpretation brings about change (Kincheloe & McLaren, 2002). Critical theorists work with research participants towards revealing the knowable, objective, world through questioning and critique (Coghlan & Brannick, 2010; Crotty, 1998). Interpretation is undertaken to reveal “power dynamics within social and cultural texts” that are regarded as knowable and in need of examination (Kincheloe & McLaren, 2002, p. 98). Action research within a critical paradigm “... involves interrogation, deconstruction and decentring” and “... demands higher-order questioning” (McNiff & Whitehead, 2010, p. 17).

Where previously power relationships were seen as the colonising aspects of the grand narratives within a society, critical theory now views power relationships as more complex, dialectical and subtle (Kemmis & McTaggart, 2008; Kincheloe & McLaren, 2002). It pays attention to the power relationships seen as inherent in all aspects of life (Kemmis & McTaggart, 2008; Kincheloe & McLaren, 2002). Dialogically revealing all forms of power differential sets a path for informed change or at least a contribution to building capacity for change and is therefore a step toward realising the aims of greater autonomy and self-determination (Kincheloe & McLaren, 2002). Action research, therefore, sits within the critical theory paradigm by seeking to understand and respond to social structures operating in the world.

The goals of criticality, as recognising and questioning social constructs and power relationships and empowering change, underscore every aspect of this action research project. Critique applies to interpreting and understanding the issue being addressed, as well as the undertaking of the action research: the research design, process and outcomes, as well as the researcher's own practice. Exploring participants' individual and multiple perspectives is essential to understanding and resolving the issues and where the issues arise from power imbalance (Kemmis, McTaggart, & Nixon, 2014). A critical approach brings validity to the research: to the new knowledge, the changes in practice, the resolution of the issue and the development of theories that flow from the research (McNiff, 2010).

That participants share an agreed need for change, suggests a degree of pre-existing criticality among participants. Relying on voluntary involvement of participants might be considered a limitation; however, voluntary involvement aligns with project ownership and an emancipatory process. As indicated in Chapter 2, voluntary involvement indicates motivation for bringing about change, as well as an agreed need for change that includes graduate attributes in Australian university curricula. The issue limiting change, however, is the capacity to progress and enact change (de la Harpe, et al., 2009). The challenge for action researchers and action research participants generally, therefore, is to understand and maintain the need for critique and to ask themselves how they apply and account for critique within the action research. A critical stance is needed both as a constant throughout the project; that is, formatively, and in reviewing and evaluating the study overall, summatively. While criticality is a goal strived for, it is, however, not necessarily fully realised in practice.

Critical research sees inherent power structures within the social contexts that create and reify existing practices (Alvesson & Deetz, 2000; Robottom & Hart, 1993). The paradigm shift (Sterling, 2004a) and re-envisioning (Huckle, 2004) required to bring about sustainability learning is supported when participants are encouraged to reflect on their understandings in a range of areas, including sustainability, higher education and their disciplines. Critically questioning these understandings helps reveal how they are socially constructed, empowering them to bring about change in the systems that have created their issues of concern (Burns, 2000, p. 453; Fien & Hillcoat, 1996; Tilbury, 2004). Therefore, action research has emancipatory aims for participants to become more aware of and engage with the political nature of social relations and interactions in relation to both the

issues the research is seeking to address (here, that is the need for more sustainability oriented curricula) as well as the process of action (the curriculum change) itself.

The collaborative nature of action research emphasises the importance of allowing participants to decide for themselves and to be empowered in their decision making and practice. Empowerment is, however, limited to the scope of control that the participants have (Burns, 2000). Empowerment is achieved when participants are able to come together with a common goal and an approach to working together that both democratically values multiple perspectives and at the same time challenges tacit assumptions (Kemmis & McTaggart, 2008). Participants are empowered as they develop new understandings as well as new skills to develop knowledge and practices (Reason & Bradbury, 2008), and as they change their own circumstances and commit to live with those changes and their consequences (Burns, 2000; McNiff & Whitehead, 2010). Participants empower themselves as they “hold themselves accountable for what they are doing and accept responsibility for their own actions” (McNiff & Whitehead, 2010, p. 19).

For me, the implications of these principles, as the action researcher, means that supporting empowerment of the group requires me to loosen control of the process and allow the group to collaboratively agree on broad and open-ended goals to resolve any issues, such as the barriers and obstacles identified in Chapter 2, rather than starting with researcher-prescribed or specific project goals (Burns, 2000), as well as supporting them to develop their capability to undertake change (Ferreira et al., 2009).

3.3.3 Action research is emergent

Action research is necessarily “adaptive, tentative and evolutionary” (Burns, 2000, p. 451). While an action research project will have goals, how or whether these are achieved is not defined or expected to be linear or sequential (Kember, 2000). Action researchers refer to the value of the “journey” itself (see Kember, 2002; Liddy, 2012):

In many cases the journey appeared to be as important, or even more so, as reaching the final destination. The abilities and attitudes acquired on the way left the travellers well equipped to travel down similar paths in the future and keen to do so. (Kember, 2002, p. 92)

Action research, therefore, allows researchers to deeply explore issues to develop theories, rather than prove or disprove an existing theory (Fletcher & Zuber-Skerritt, 2008; Gravett, 2004). The process is “concurrent and reverberative” (Saldaña, Beretvas, & Leavy, 2011,

p. 66) across multiple, intertwining dimensions of the project and is flexible to allow the project to flow in directions guided by the action cycles (Saldaña, Beretvas, & Leavy, 2011; Wadsworth, 1998). Hence, the form, boundaries and direction of the project are determined in situ and change over time (Coghlan & Brannick, 2010). Further, learning is gained from reviewing both the “intended and unintended” (Coghlan & Brannick, 2010, p. 5) outcomes of changes and actions undertaken (Cherry, 1999; Coghlan & Brannick, 2010).

In this study, an emergent praxis-based curriculum change process was adopted. A specific solution or form of curriculum was not presumed at the beginning and was allowed to emerge and unfold, given it was not entirely clear how the project would unfold. While the group had discussed strengthening the presence of sustainability in their program, this had not progressed in any significant way. For us, it was not clear what aspects of sustainability would be included in the learning outcomes, how these would be represented in the teaching and assessment of these, and what process would be used to achieve this. The overarching goal, therefore, of the project was to embed sustainability into the TD curriculum, but the exact details of the process for achieving this were to be determined as the action research project progressed.

My preliminary data gathering for the SWOT analysis allowed me to prepare tentative goals and a plan for the action research project that drew on the theoretical frameworks underpinning the study and my experience in academic development. The project plan indicated the project design, implementation, evaluation, as well as my own role and how reflective practice would be promoted and supported. The project plan was presented to the group as a draft and modified by them before it was finalised. As expected, aspects of the project changed over time, as influenced by the project itself, and as the project continued to adapt to the changing needs and perspectives of the group (Fletcher & Zuber-Skerritt, 2008).

In studies such as this, action research cycles are employed to iteratively support the emergence, understanding, adaptation and resolution of the issue to be addressed. The stages of the cycles are generally called “planning”, “action”, “observation” and “reflection”, with some variation in terminology, purpose and conduct of the stages across the literature (e.g., Kember, 2000; Kemmis & McTaggart, 2008). The stages of a given action research cycle are expected to be fluid, overlapping and non-linear and hence the choice of cycle nomenclature becomes one of personal interpretation and extent of

meaningfulness. I have used Coghlan and Brannick's (2010) nomenclature of *constructing*, *planning action*, *taking action* and *evaluating action*, which emphasises a reflective process around the action (see Figure 3.2). Each stage is outlined below. The group works systematically through the stages of the action research cycle in order to make progress towards achieving the project goals. After each cycle has been completed, the group determines if the intended outcome has been achieved and decides if a further cycle is required (Creswell, 2005).

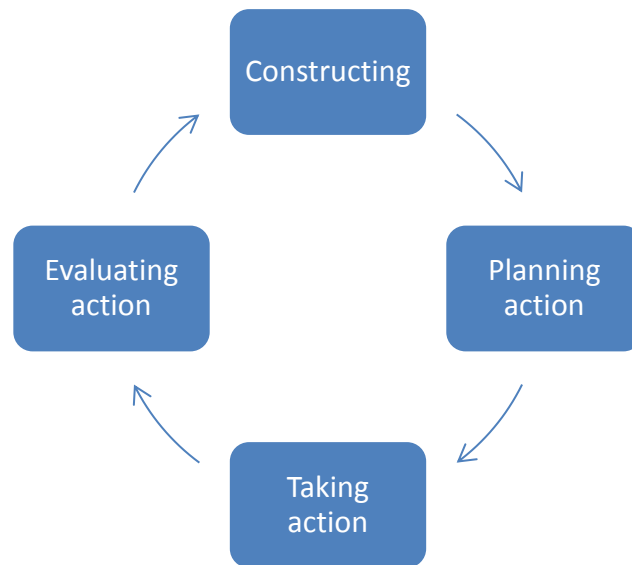


Figure 3.2: An action research cycle.
Adapted from Coghlan and Brannick (2010).

Stage 1: Constructing. In their model of action research, Coghlan and Brannick (2010) follow developing an understanding of the context and purpose for the action research with the step of constructing. Constructing is “a dialogic activity in which stakeholders of the project engaged in constructing what the issues are however provisionally, as a working theme, on the basis of which action will be planned and taken” (Coghlan & Brannick, 2010, p. 9). The group collaboratively considers and clarifies the issues or problems they seek to address for the particular cycle. The group unpacks the practical and theoretical aspects of the issue, seeking to create a shared meaning of it. Here, participants are collaboratively engaged in close questioning and exploration, or a critical review of the problem within its context scopes the landscape of the situation and informs the next steps. The critical review leads to the formulation of interpretations or “general statements which attempt to explain some of the facts of the problem” (Burns, 2000, p. 446). The interpretations are informed by exploring existing literature and research on a needs basis

(Burns, 2000; Cherry, 1999), as identified from earlier stages of the cycles. The statements or interpretations are then investigated with the collection and analysis of relevant data or evidence.

Stages 2 and 3: Planning and taking action. Based on the work of the constructing stage an action plan was collaboratively developed and implemented by the group. Action planning aims to makes changes that will lead to improved practice and/or better understanding of the issue.

Planning and taking action includes determining the data that will be collected as data collection ideally fulfils multiple tasks. Coghlan and Brannick (2010) recommend data generation rather than data collection. Data generation is data collection that includes a form of intervention. Data generation emphasises that data collection should also be beneficial for progressing the project and should apply to all forms of data collection techniques. The intervention – for instance, a discussion or workshop – creates both an opportunity for learning as well as a source of data.

Stage 4: Evaluating the action. This first involves compiling the multiple sources of data that demonstrate the consequences of the action. The data provides for determining how well action was implemented, collecting unintended effects, and triangulation of the data (Burns, 2000). This is then analysed and reflected upon by the group to determine and interpret what has been achieved. This evaluation, based on the data, informs the constructing stage of the next cycle so it is therefore necessary to analyse data in situ and in a timely way (Dick, 1993).

This cyclic process provides learning and teaching efforts with “a logical approach to testing and development” (Kember, 2000, p. 27). Typically, the first action cycle the researchers engage with addresses the original issue. Subsequent action cycles are then used to make further improvements to the issue, based on the outcomes of the first cycle, or address related issues which have arisen from the first cycle. In the case of curriculum change and of this project, the action research cycle can be mapped onto a standard curriculum change process of curriculum evaluation, curriculum change and curriculum implementation where each stage of the curriculum change process has an action cycle applied to it (Stringer, McFadyen Christensen, & Baldwin, 2010). An example of this approach in higher education curriculum change is where three cycles of action research were conducted to embed graduate attributes across selected courses within a postgraduate coursework program. The project involved planning and developing learning outcomes and

“revising the assessment criteria and considering demonstrable evidence for increasing awareness and development of graduate attributes” (Treleaven & Voola, 2008, p. 166), based on the teaching of the course and student feedback.

Reviewing actions and changes (intended and unintended) and contextual theorising about these changes are identified among the group, as discussed above. Unlike traditional research, such evaluation is formative rather than summative (Fletcher & Zuber-Skerritt, 2008). Evaluating local changes is self-evaluative in action research in situ as action cycles are worked through (Burns, 2000; Coghlan & Brannick, 2010). Participants evaluate the action research in order to achieve internal validity; that is, standards of validity according to the needs of participants, rather than an external audience. An evaluation plan is developed that includes the criteria and standards used to judge quality (Burns, 2000; Coghlan & Brannick, 2010; Ives, McAlpine, & Gandell; McNiff & Whitehead, 2010).

Internal validity supports empowerment of participants to own the project: “... the validity of the ‘theories’ it generates depends not so much on ‘scientific’ tests of truth, as on their usefulness in helping people function more intelligently and skillfully” (Burns, 2000, p. 443). Consequently, the context-based nature of action research evaluation suggests evaluation is not likely to be precisely replicated elsewhere; rather, evaluation contributes to the generalisability of the theories arising from the research (Burns, 2000). However, proponents of critically oriented action research would argue that stated internal validity is not enough to demonstrate quality and rigour in the research. Critical action research emphasises the application and evidencing of critique across the study: in the project design, the project process, and evaluating the project outcomes. Claims of internal validity are backed by painstaking critique that contributes the value of the internal validity itself; that is, revealing deeper insights to participants. Critique also contributes to external validity of the findings that inform generalisable theories that provide new knowledge for the wider academic community. Critique is demonstrated by deep critical analysis of rigorously collected data to reveal new insights in relation to the content, process and premises associated with the process (Cranton, 2006), the outcomes of which then inform the next steps of the process. A challenge for action research to gain credibility in the wider research community comes when reports of action research fail to provide evidence of critique to back up findings. In most action research studies reviewed for this chapter, the evaluation frameworks used by action researchers show variation in the critique of evaluation frameworks. For example, Burmeister and Elks (2013) used action research to

embed sustainability learning into a pre-service teaching module. Evaluation of the curriculum change involved gathering students' perceptions of the learning experience, as well as the action researchers' reflection on their practice, which presents a subjective means of revealing how the aims of the project were met. In another example of action research-based curriculum change, Hazelton and Haigh (2008), through critique of their practice, move from gathering student perceptions to reviewing student assessment as a stronger measure to establish the impact of the curriculum change.

Three cycles of action research were employed in this study (see Figure 3.3). The first cycle established the sustainability related learning outcomes that were to be embedded into the TD curriculum. The second cycle developed the learning activities and the assessment tasks associated with the new learning outcomes. The third cycle sought to refine the assessment tasks, arising from the experience of teaching the new learning outcomes for the first time.

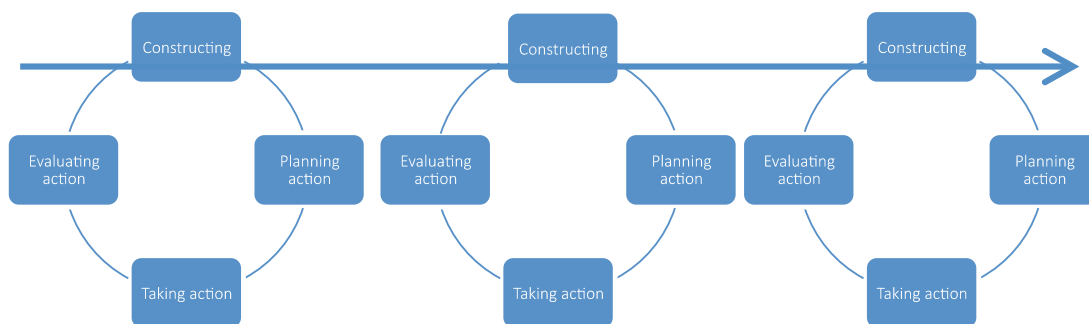


Figure 3.3: Focus of action research cycles used in the project.

Adapted from Coghlan and Brannick (2010).

In practice, the steps of the cycles were conducted largely within a series of group activities, primarily run as workshops. In general, as the facilitator, I suggested the workshop program be based on the group's suggestions and needs, identified either collaboratively at the end of the previous group session or in response to emails I circulated seeking input. A few days prior to the activity, I circulated the workshop

program, inviting further comment and suggestions. Additional activities arose out of the group activities and supported the work of the cycles either directly or indirectly. These involved a small number of academics and/or me in, for example, activities focussing on the specific interests of those academics, data collection and reporting aspects of the project to others outside the group.

3.3.4 Action research involves learning

Burns (2000) advises that action research provides the dialectical environment necessary to support meaning making and to support the generation of new ideas and practices. The reflective process of ongoing critique and evaluation supports formative change, theorising and transformation; that is, learning (Fletcher & Zuber-Skerritt, 2008; Zuber-Skerritt & Fletcher, 2007), or, as Burns (2000) suggests, bridging theory and practice within the project. Indeed, action research is seen as an exemplary strategy to foster transformative learning (Cranton & Hoggan, 2012; Kasworm & Bowles, 2012). Building criticality into reflection supports learning by questioning existent insights to promote new insights, which supports learning and improved practices (Burns, 2000; Coghlan & Brannick, 2010; Kemmis & McTaggart, 2008; McNiff & Whitehead, 2010; Zuber-Skerritt, 2002). Each of the steps of the action research cycles generates a learning process based on action and reflection-on-action (Coghlan & Brannick, 2010; Zuber-Skerritt & Fletcher, 2007). According to Coghlan and Brannick (2010), experiential learning occurs at each stage of the action research cycle. Each stage of the cycle provides participants with an experience from which they gain insights and understandings, and evaluate (judge) and decide how to take further action, as depicted in Figure 3.4.

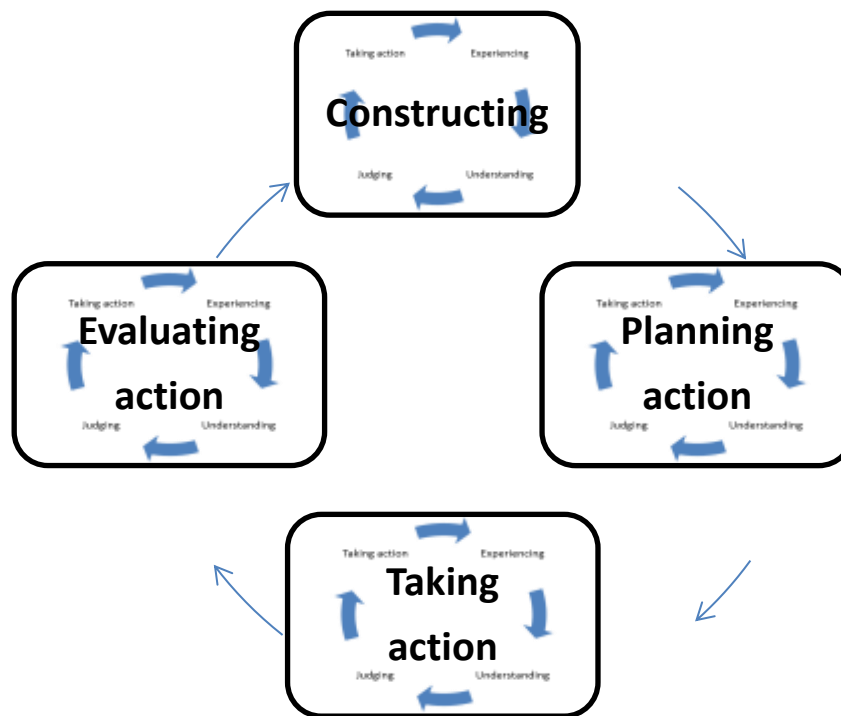


Figure 3.4: An action research cycle indicating the learning process associated with each step of the cycle.

Note: Sourced from Coghlan & Brannick (2010).

Participants use critical and systems thinking and creativity to achieve second order change (Creswell, 2005; Zuber-Skerritt & Fletcher, 2007; Zuber-Skerritt & Perry, 2002). Reflection is promoted through participant discussion, which share insights and multiple perspectives, analyse practices and collected data, review existing theories and literatures on common issues, leading to deeper insights of the issues under investigation (Burns, 2000; Zuber-Skerritt & Fletcher, 2007). Participants develop local theories, which are then validated through practice (Burns, 2000; McNiff & Whitehead, 2010). Over time, this iterative approach supports deeper and richer exploration that reveals new insights and thus enables change.

Specifically, this project involved academics working on their co-owned curriculum, rather than individuals working separately on their courses alone. This involved a series of facilitated group workshops aiming to promote experiential learning in relation to sustainability-related curriculum design. To begin with, the workshops aimed to establish agreed goals of the project, and explore and share understandings of sustainability and how

these related to the TD curriculum. Critique was built into the project to support transformation by questioning the existing context. Relevant data was gathered and then analysed as a group with a view to understanding the underlying reasons why sustainability was not already embedded into the curriculum and how this might be achieved within the project, with a view to achieving lasting change.

3.3.5 Action research is participatory

Action research is underpinned by the active engagement or participation of those involved; that is, where stakeholders are consenting, share the goals of the project, know the research objectives and are motivated to achieve these (Burns, 2000; Creswell, 2005; Kemmis & McTaggart, 2008). “Capturing multiple and diverse interpretations adds to a deeper, richer picture of the issue at hand and holds the key to more effective resolution for the long term” (Coghlan & Brannick, 2010, p. 57). Further, “a ‘collective culture’ ... enhances the reflective capacities of individual teachers” (Burns, 2000, p. 453), as well as supporting individuals involved to come to see their problems are shared and therefore normal, reducing feelings of isolation. This collective culture both arises from dialogue and promotes further dialogue (Burns, 2000). Moreover, empowerment for change arises from the shared commitment afforded by and made to the group (Kemmis & McTaggart, 2008). Even if all do not agree on aspects of the project, there is a commitment to collaborate, even if it means disagreement (Kemmis & McTaggart, 2008).

Both local and professional knowledge are needed to solve problems (Greenwood & Levin, 2008). Participants bring important insights, skills, approaches and knowledge that enable better understanding of the problem and its resolution (Wadsworth, 1998). Collaboration between researcher and participants promotes using this expertise to co-create research design and practice as well as professional practice (Gibbs, 2001; Kemmis & McTaggart, 2008). Similarly, researchers’ perspectives are included in the research, unlike in more traditional forms of research. Rather, a more authentic approach is to share perspectives and preferences, so that the participants are better informed and can make up their own minds (Wadsworth, 1998). In this way, the concern of researcher subjectivity is addressed through critical dialogue.

Identifying who needs to be involved in action research is critical to the sorts of outcomes that might be achieved. The involvement of the broadest representation of stakeholders brings diverse perspectives and knowledge to the problem as well as the specific insights of the locally owned problem or understood context, and supports greater innovation of

problem solving (Greenwood & Levin, 2008). Participants are therefore invited to be involved in the project from the full range of the stakeholders.

To both “secure and legitimate the change” action research relies on “the willing and committed involvement” of stakeholders whose practice is the focus of the change (Kemmis & McTaggart, 2008, p. 277). An expectation of full and equal participation in action research is, however, an ideal (Reason, 1988). A person’s participation will most likely take different forms, with variation in roles and levels of involvement among individuals. Participants can:

jointly define research objectives and political goals, co-construct research questions, pool knowledge, hone shared research skills, fashion interpretations and performance texts that implement specific strategies for social change, and measure validity and credibility by the willingness of local stakeholders to act on the basis of the results of the action research. (Denzin & Lincoln, 2011, p. 21)

As a minimum though, participants will be involved in the creative aspects of the project – the visioning, planning and design – as well as collaborative activities (Reason, 1988). Where participation of all stakeholders is not possible, the creation of new practices will have broader acceptance when the views and perspectives of stakeholders have been incorporated into the process (Kemmis & McTaggart, 2008).

The notion of the “action researcher” has changed over time and among action research proponents. In earlier conceptions, all participants were viewed as action researchers. This was aimed at empowering all participants through shared ownership and responsibility and supporting the egalitarian values associated with action research (e.g., Burns, 2000). More recently, and more authentically, the title of “action researcher” has shifted to those who carry the responsibility for initiating, conducting and reporting on the research (Coghlan & Brannick, 2010; Kemmis & McTaggart, 2008).

Sustained and engaged practice by participants, however, is difficult to maintain during the project for a number of reasons (Wadsworth, 1998). Participants can find the project overly time consuming, there might be an unwillingness of participants to share experiences, participants may find reflexivity to be “challenging and threatening” (Harland & Staniforth, 2000, p. 510), participants are likely to have competing priorities over the course of the project, and participants may find the experience unsatisfying due to the lack

of participation of others. Problems arise when there are incongruent aims and expectations between participants and the researcher (Burns, 2000).

The action researcher works “at keeping inquiry active ... testing as to whether consensus exists concerning the array of issues which could be addressed ... building collaborative relationships ... negotiating roles” (Coghlan & Brannick, 2010, pp. 55, 61). Empowerment of participants is achieved when individuals (including the action researchers) and the group act consistently with the principles of action research.

3.3.6 Action research is supported by external facilitation

The role of the external facilitator in action research has been controversial and has shifted over time. Carr and Kemmis (1986) originally saw the facilitation role as needing to come from within the collaborative group as “an outsider would actually undermine the group’s collaborative responsibility for the process” (Carr & Kemmis, 1986, p. 204). The role of the researcher as external facilitator is now viewed as valuable when undertaken consistent with the above action research principles, as the facilitator has valuable expertise, with a proviso that issues such as collaborative responsibility are objectively addressed (Kemmis & McTaggart, 2008).

Indeed, the achievement of the principles and practices of action research is better supported when there is a facilitator: a guide and supporter of the group-owned project (Wadsworth, 1998). The combined facilitator/researcher role is seen by participants to contribute to the resolution of the issue as their role brings the passion, the expertise and creativity of the researcher (Fletcher & Zuber-Skerritt, 2008). The facilitator supports the learning and the research process experienced by participants (Tilbury et al., 2004). The action research approach used by Benn and Dunphy (2009) describes the researcher’s crucial task in supporting sustainability curriculum change as one of facilitation. Here the traditional researcher role sits behind the facilitator role and is more an observer. This supports the group to maintain greater empowerment as they maintain greater control and ownership of the project and avoid subjugation by the researcher role (Wadsworth, 1998). Consequently, Wadsworth argues, this approach supports ongoing involvement of participants as participants feel empowered. The facilitator needs to continually check in with participants to ensure there is consensus regarding the issues that need to be addressed (Coghlan & Brannick, 2010).

The role of the facilitator is multifaceted. It includes forming contacts, identifying stakeholders and key individuals, “negotiating the researcher’s role” (Creswell, 2005, p. 556), researching and clarifying the initial research context, and imbuing and undertaking the project with values associated with emancipation and democracy. Different and changing perspectives among participants require flexibility of the facilitator to adapt strategies (Coghlan & Brannick, 2010). The action research process involves the group of participants working together on addressing the issue over an extended time period in an authentic workplace. As referred to above, the project itself is emergent, hence the exact direction and form of the project is changing. In addition, participants will undertake normal duties in addition to their participation in the action research project. While the project makes changes, other changes also impact individuals’ lives and the workplace and hence the project. This is a dynamic process within a dynamic context that can make it challenging for the project to progress. Awareness and the active management of this situation are needed by the facilitator (Kemmis et al., 2014).

Kemmis, McTaggart, and Nixon (2014) advise that the facilitator possess expertise in their own knowledge and practice spheres as well as skills in listening, being open to learning, allowing contributions from others, diplomacy, determination, and creating safe spaces where participants feel comfortable to participate fully. The ability to establish robust and quality relationships is needed to progress the project and negotiate difficult situations within the group as they arise (Coghlan & Brannick, 2010). The facilitator is experienced in “cooperative study of educational problems ... able to work effectively with others who are also involved in the situation they are trying to improve” (Burns, 2000, p. 445). Creativity is also required so the design of the action research project supports participants to come up with the best possible range of ideas and strategies to address the issue (Wadsworth, 1998). In this way, the facilitator can bring skills and attributes to provide the flexibility and responsiveness Dick (1996) sees as needed to maintain and progress the action research project.

Establishing a dialogic approach also sets up scope for negotiation to resolve issues that arise within the research process. Without negotiation, that is, by shying away from issues, the project might break down (Coghlan & Brannick, 2010). A dialogical context promotes empowerment through a shared valuing of multiple perspectives (Crotty, 1998). Participants are co-owners of their information and of the research more generally, including decision making promoting self-determination (Gibbs, 2001). Gibbs

acknowledges a potential conflict for the researcher/facilitator with the empowerment of participants creating “loss of control” (Gibbs, 2001, p. 30) for the researcher, although this is purposeful for the facilitator. Yet all research, both those of fixed and flexible designs, is not in the full control of the researcher. Robson’s (2002) response is to see such loss of control as potentially part of the research process, part of the phenomena being researched and therefore to some extent anticipated, even welcomed through negotiation, “enabling the sensitive enquirer to capitalize on unexpected eventualities” (Robson, 2002, p. 6).

Ensuring quality of relationships, therefore, was an important factor in the project to promote and progress action research (Kemmis & McTaggart, 2008) and also the curriculum change generally (Priestley, 2011). Relationships needed to be “... open and fluid” (Kemmis & McTaggart, 2008, p. 583). Indeed, ensuring dialogue among participants and providing adequate support enhances the quality of relationships in curriculum change (Priestley, 2011).

At a more personal level, the researcher/facilitator needs to also have an internal strength. In reality, action research success is demanding and difficult to achieve (Ferreira et al., 2009; Tilbury et al., 2004). They need to “work at keeping the inquiry active” (Coghlan & Brannick, 2010, p. 55). In postgraduate theses there are higher attrition, higher failure and longer completions rates in projects using action research methodologies (Zuber-Skerritt & Fletcher, 2007). Being both facilitator and researcher “demands commitment, is often uncomfortable, takes too long and yet opens up new vistas, gives glimpse into different lives and can offer new possibilities for changes in direction, self-growth” (Robson, 2002, p. 2). And then the facilitator needs also to be able to let go from the role. The guidance of the facilitator “will at first be rather important, but will diminish as the participants gain knowledge and experience”, yet the facilitator needs “... to prepare the participants in such a way that the participants can take over the work themselves when the researcher leaves the group” (Burns, 2000, p. 445). Critical self-reflection is also required of the facilitator to recognise one’s own subjectivity in the research process and to mitigate researcher subjectivity (Cherry, 1999; Fletcher & Zuber-Skerritt, 2008).

In practice, action researchers emphasise the importance of adequate time for the project (Tilbury et al., 2004): “seeking to bring about system-wide change is an ambitious project, one that requires a great deal of effort and time” (Ferreira et al., 2009, p. 1).

Powerfully, Fletcher and Zuber-Skerritt (2008) conclude:

... regardless of the field (an academic discipline, politics, action research etc.), the facilitator's presentation skills (actions) depend on his/her commitment, values, and conviction concerning the content of the message. Unless the facilitator can manage processes to engage participation and collaboration, their actions and message will have minimal impact. (p. 91)

The participants in this study, including myself as the action researcher, form what I refer to as "the group". I am the action researcher collaborating as a facilitator with a group of participants in an action research project (Wadsworth, 1998): a participant/researcher. As the researcher, I am committed and involved in the project; I am a stakeholder (McNiff, Lomax, & Whitehead, 1996). Unlike other research methodologies, I also take an active role in the project as a participant facilitator. I contribute my particular expertise to the project (conducting the project and learning and teaching support), as the others in the group contribute theirs, in order to support the group to achieve the shared goals of the project (Fletcher & Zuber-Skerritt, 2008). A specific program of activities does not form part of this research design as these are based on discussions with the participant group to identify what is that they feel will assist them to achieve their goals.

3.3.7 Action research emphasises the role of values in research practice

The practice of critical research requires a focus on purpose of the research, that is, to bring about lasting and meaningful change. Consistency between the purpose and the practice underpin critical theory-based research, where the principles of critical theory guide the research process (Alvesson & Deetz, 2000). Critical researchers emphasise a need to maintain awareness of value-based decisions while undertaking the research itself (Kincheloe & McLaren, 2002; McNiff, et al., 1996). Using these principles and practices consistently underpins the research as critical practice, where a pragmatic approach alone would undermine the process (Kincheloe & McLaren, 2002). Primary among these is that the priorities of the participants takes precedence over those of the action researcher (Alvesson & Deetz, 2000; Zuber-Skerritt & Fletcher, 2007). This is both ethical and practical. Any conflict of interest can derail the process. In practice, the participation and engagement required of action research can only start to be achieved if participants have a commitment to the problem. An action researcher who maintained a separate agenda to the goals of the group could not consider themselves to be acting in the interests of the group; rather, they would be acting in their own interests and therefore unethically. For participants, this may result in reduced participation and overall failure of the project to achieve worthwhile outcomes; potentially wasting time, effort and impacting relationships

in the workplace and hence compromising the commitment of the researcher not to jeopardise or put the participants at risk. For the researcher, this may result in a project that may not address the overarching research aims of the study (Zuber-Skerritt & Fletcher, 2007).

Essentially, the goals of action research, that is, lasting change of an issue of significance, can only be realised when these principles are in place. Quality in practice is demonstrated when the action research project:

- empowers participants (Creswell, 2005), such that the views and values of all participants are respected and participants make decisions pertaining to the research accordingly (Kemmis, et al., 2014, p. 36);
- researchers and practitioners democratically work together as equal partners to address issues associated with practice (Burns, 2000; Creswell, 2005);
- supports participants to collect and analyse their own data to support deep theorising and critique by participants (Creswell, 2005; Reason, 2006; Wadsworth, 1998);
- develops knowledge and skills for participants (Burns, 2000, p. 445);
- leads to action and change (Greenwood & Levin, 2008; Reason & Bradbury, 2008);
- achieves respectful collaboration with others that generates a synergy and a collective “willingness to share knowledge, information and skills for problem solving” and team work necessary to sustain participation and purposeful change (Burns, 2000; Creswell, 2005; Zuber-Skerritt, 2002, p. 148);
- maintains participant engagement (Greenwood & Levin, 2008);
- is informed by validated evidence and data (Coghlan & Brannick, 2010; McNiff & Whitehead, 2010);
- clearly addresses an issue in practice that needs to be solved (Burns, 2000; Creswell, 2005; Lincoln, 1998);
- has a valuing of professional learning and personal learning and a commitment to improving practice (Burns, 2000; Zuber-Skerritt & Fletcher, 2007);

- uses the authenticity and validity of the self-evaluation process undertaken by the group to mediate the values-based conduct of the project (McNiff & Whitehead, 2010).

Achieving these values in practice inherently brings additional values into play. Collaboration is a democratic, open process and relies on trust between participants (Burns, 2000; McNiff & Whitehead, 2010; Zuber-Skerritt, 2002). Trust allows for admitting ignorance or failure, and uses learner-centred approaches to create an environment in which participants are more open to critique, reflection, and action (Zuber-Skerritt, 2002). Voluntary participation underscores this approach and promotes ownership of the decisions, actions and outcomes of the research (Mattsson & Kemmis, 2007; Tilbury et al., 2004).

3.4 Data Collection and Analysis Methods

The forms of data collected and the data collection techniques used in this project were determined and agreed to within the group in an evolving process based on the needs of the group, according to the issues or questions that arose from the action cycles (Kemmis & McTaggart, 2008; Mattsson & Kemmis, 2007). The data is collected therefore to support evaluation of the changes taking place rather than focussing on individuals' beliefs and perspectives as might be found in more traditional forms of research (Kemmis & McTaggart, 2008). Data is also used to evaluate the study, with the vast majority of the data collected used for both purposes. The treatment of this data (analysis and application of findings) may also have been different depending on the different purposes to which it is put.

Preemptively determining the forms and amount of data collected in action research is not entirely possible given the emergent design, yet guidelines exist. The data collected is determined by the types of knowledge claims being explored (Mason, 2005). Lodico et al. (2010) suggest data collection be simply done to manage the dual role of researcher/practitioner. They note it is not usual to formally establish reliability and validity for each set of data; rather, the focus is on collecting multiple sources of data that can be used to triangulate aspects to be studied. The more data sources, the more opportunity for triangulation (Creswell, 2005). Moreover, Kemmis, McTaggart, and Nixon argue that "change over time" (a goal of action research) (2014, p. 75) requires observing a dynamic process and can, therefore, only be demonstrated through triangulation of multiple sources and forms of data. However, while all data is pertinent to the study, it is

not all used in a thesis (Cherry, 1999). Further, Burns (2000) cautions not to collect more data than can be analysed and used for reflection at a given time.

Both qualitative and quantitative data was collected for this action research study (Burns, 2000; Creswell, 2005). This included my particular questions as both facilitator and researcher. The range of data collection techniques was large and included interviews, observation, artefacts and surveys (Burns, 2000; Creswell, 2005). The specific forms of the data collected are:

Interviews/Group discussion

- one-to-one semi-structured interviews with academics;
- recordings of group discussion during workshops.

Observations

- observation of sustainability teaching (twice per semester per academic during the implementation of the new curriculum).

Surveys

- Academic Survey 1 – conducted between developing and implementing the new curriculum (early 2010);
- Academic Survey 2 – second year of the new curriculum (mid 2011);
- student surveys – pre-, mid- and post-implementation the new curriculum (2010).

Artefacts

- former and revised curriculum documentation;
- workshop planning documentation and resources and materials shared among the group;
- workshop materials generated within workshops by the group;
- materials generated by members of the group reporting aspects of the project, including award submissions, conference papers and reports and presentations within the school;
- facilitator's journals and notebooks;
- evaluation reports of student assessment.

The timing and forms of data collection are indicated in Figure 3.5.

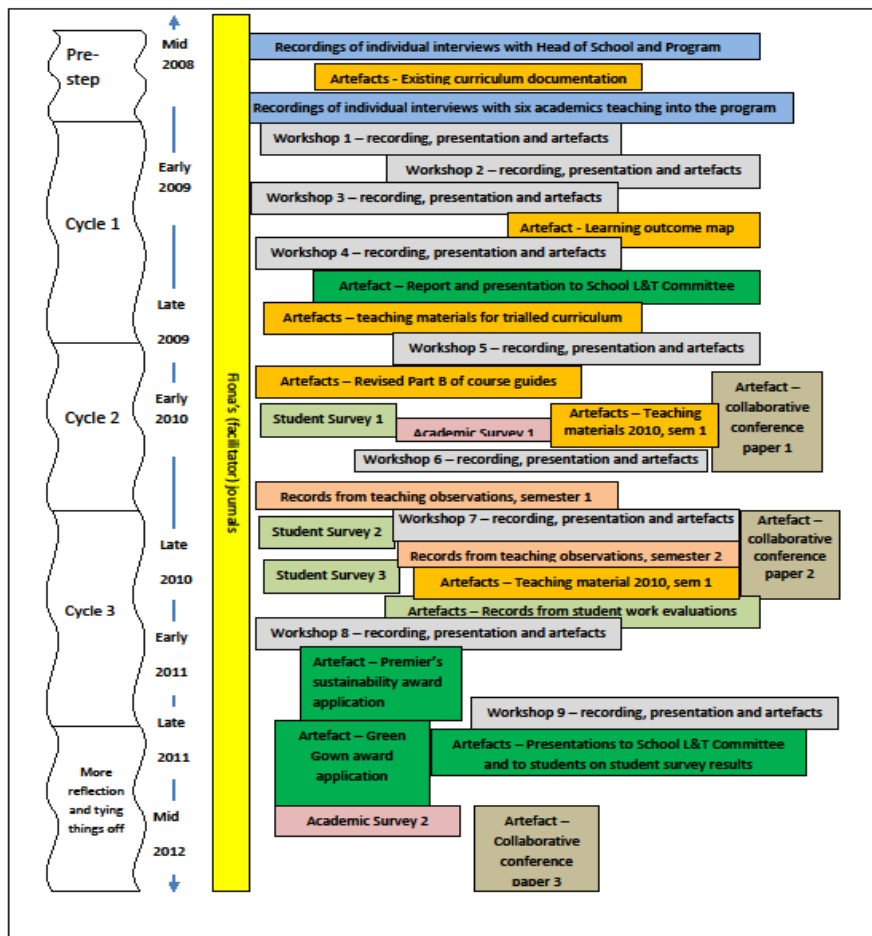


Figure 3.5: Representation of the forms and timing of data collection over the project.

A challenge arises in explaining to external parties and readers of this thesis when and how the data was used. This is accounted for largely by the use of narrative in writing the thesis, where I explain my in-situ decisions and actions as part of the narrative (in Chapters 5 and 6), using my journals to evidence these moments in the story. To write the thesis, I collated the data into a spreadsheet with columns relating to activities and events over the course of the project. The spreadsheet rows include details of the activities as well as coding themes I identified from the data. The content may refer to the intent of an activity, an individual academic or my practice, for instance. The range of coding themes emerged from the data as I sifted through this over time. I had used NVivo data analysis software (http://www.qsrinternational.com/products_nvivo.aspx) for this work; however, the clear visual representation provided by the spreadsheet allowed me to more easily explore the data chronologically, helping me to identify the narratives within the data.

3.4.1 Interviews and group discussion

Interviews with academics. Individual in-depth, open-ended, discursive individual interviews were conducted with the Program Coordinator, the Head of School and the six other academics making up the group, to inform the pre-step. The interviews aimed to:

- allow me to meet and start to get to know each participant (Minichiello, Aroni, Timewell, & Alexanders, 1995);
- hear individuals' interpretations of the context and issue (Minichiello et al., 1995);
- demonstrate that I valued the views of participants as peers (Minichiello et al., 1995);
- allow for deep discussion of issues to explore themes with the participants' own use of language to develop the fullest picture possible to the context (Lodico et al., 2010; Minichiello et al., 1995; Schön, 1988);
- allow me to determine what representative issues, factors, and concerns were shared among the group.

Interviews were conducted as semi-structured, open-ended conversations based on an interview schedule circulated to participants days prior (Lodico et al., 2010) (see Appendix A). Interviews were conducted on campus and took between 1 and 2 hours. All interviews were recorded, except in the case of the program coordinator when I was without recording equipment and therefore took detailed notes. Recordings allowed me to focus on my facilitation role rather than taking notes, and provided an accurate record of the discussion.

Interviews were transcribed verbatim according to the process outlined below. The completed transcripts were returned to the interviewee for their information and for member validation feedback or comment (Boeije, 2010). In the case of the unrecorded interview, I summarised my notes and similarly forwarded this to the interviewee (the program coordinator) for comment. No feedback was received.

For the SWOT analysis I listened to the interview recordings and used an open coding approach. This was followed by axial coding of these open codes according to the four broad categories of a SWOT analysis (Boeije, 2010). An analysis of the interview transcripts was done later. The transcripts were coded, again using open coding in NVivo. A copy of the codes can be found in Appendix B.

The findings from the interviews were validated in two ways. During Workshop 1 the group agreed with the findings of the SWOT analysis fulfilling member validation (Boeije, 2010). Much later when I coded the transcripts, I found strong intrarater correlation

(Lodico et al., 2010) between the themes identified in the SWOT analysis and the coded themes in NVivo.

Group workshop recordings. Each of the nine group workshops was recorded and transcribed in the manner described below after the project had concluded. I analysed the workshop recordings by reading over the transcripts a number of times, looking for themes, consistent with the idea of “sifting the data”. This was not formal coding but something similar where I highlighted, related and made connections within the data as a whole. I listed the themes and the sections of dialogue as a spreadsheet that chronologically mapped the main project activities and events. Validation of this sifting process involved triangulation with other collected data.

Transcribing recordings. The style of transcribing used has been consistent for all interviews and group workshops (Kvale, 2007). All spoken words are included in the transcription. For the workshops, which involved up to eight participants including myself, I transcribed the entire recording for a number of these. I found the time demanded for this became prohibitive (Kvale, 2007). Verbatim transcriptions, however, are not required in all cases. I began summarising sections of recording I deemed not directly related to the project (Saldaña et al., 2011).

Interviews and group workshops were recorded and transcribed to undertake “meaning analysis”, to identify themes and elements of narratives rather than “linguistic analysis” (Kvale, 2007, p. 97). Punctuation was therefore added to give the transcription a “written style” (Kvale, 2007, p. 95). Square-bracketed terms indicate non-verbal communication. Group recordings include sections where several people spoke at once. In these cases, I have separated out the different voices and ordered these to best reflect the discussion flow within the recording.

3.4.2 Surveys

Surveying academics. Two surveys of the academics involved in the project were conducted. These surveys asked academics, albeit in different ways, about how they had experienced the project to date. Again, these were self-developed surveys (Lodico et al., 2010). The surveys were used within the project to inform my practice as facilitator of the project, as well as providing an additional data source for the study overall. Survey 1 was undertaken in early 2010 and Survey 2 in mid-2012.

Survey 1, Embedding Sustainability in the Curriculum, was a survey of academics' experience of the project that asked about academics' experiences and impressions of the first cycle and part of Cycle 2. Survey 2, Textile Design Sustainability Curriculum Project 2012 Survey, asked about academics' impressions of the project after it had wound down and their views of the project outcomes; hence, this survey was a form of follow-up survey (Lodico et al., 2010).

Survey 1 was designed to give a sense of what approaches were useful and which were less so, how academics viewed the progress of the project, how academics viewed core concepts at the time and how they felt about the project. Engagement indicators (Coates, 2008; Iverson, 2008) guided the development of the survey after adapting these for curriculum change, resulting in the following indicators:

- Individuals perceive a level of personal control over the curriculum design process.
- Individuals have a clear understanding of the goals, activities and outcomes associated with the curriculum design process.
- Individuals have a personal connection/ commitment to the curriculum design process (adapted from Iverson, 2008).
- Individuals experience academic challenge.
- Individuals engage in active learning.
- There is learner and facilitator interaction.
- Individuals engage in enriching educational experiences.
- Individual are provided with a supportive learning environment.
- Individuals associate the project with their professional work (adapted from Coates, 2008).

The survey instrument included questions that asked academics about the following:

1. In relation to the project activities:
 - appropriateness towards achieving the project goals (importance);
 - execution of the activities (performance).
2. The extent to which they experienced:
 - academic challenge;
 - active learning;
 - learner and facilitator interaction;
 - enriching educational experiences;
 - a supportive learning environment;

- relevance to their professional work;
 - personal control over the academic development process;
 - understanding of the goals, activities and outcomes associated with the academic development process;
 - connection/commitment to the academic development process.
3. Their confidence to teach sustainability; based on Zuckerman (1960) and Zuckerman, Lubin, and Rinck (1983), to measure anxiety; adapted for learning contexts by Fraser, Nash, and Fisher (1983).
 4. Their understanding of sustainability and sustainability teaching, and how this might have changed.
 5. Their perceptions of the achievement of the project goals.
 6. Their suggestions of additional activities that would assist achievement of the intervention goals.
 7. Their perceptions of intervention – overall satisfaction.

Hard copies of surveys were anonymously completed by all seven academics. I first gathered impressions from the survey to inform my practice at the time. I noted the activities that were found most and least useful and incorporated this into my approach. I did not formally report the results back to academics, but mentioned aspects when these came up in discussion.

In relation to using the results more formally, I summarised the quantitative results using descriptive statistics. Open-ended questions were coded using a descriptive coding technique appropriate to the number of responses and the nature of the questions. The results of this survey contributed to a body of data from which overall findings and conclusions were drawn. These findings and conclusions were validated by triangulating various forms of collected data, including these survey results. (see Appendix C for details of this survey and the results.)

Survey 2 was a short survey consisting of five open-ended questions asking academics to identify the best aspects of the project, suggested improvements that could be made, outcomes from the project, changes made to the curriculum and overall benefits of the project. It was completed by all seven academics anonymously online using Survey Monkey. I used descriptive coding to code these open-ended questions. The results of the survey were not formally validated with academics; rather, they were accepted on face value. Again, the results of this survey contribute to a body of data from which findings

and conclusions are drawn. These findings and conclusions were validated by triangulating various forms of collected data, including these survey results (see Appendix D for details of this survey and the results).

Surveying students. The purpose of the student survey was twofold. First, the survey aimed to generate useful information for the academics to inform their teaching approaches and improvements. Second, the survey would provide data to inform the overall evaluation of the project in relation to student learning and/or change.

All students in the program were invited to be surveyed about their sustainability-related knowledge and attitudes, their intentions to act sustainably, the relationship they see between sustainable practice and their discipline/profession and their confidence to act sustainably in the professional context.

Student respondents completed the same survey instrument three times during the full academic year in which the new curriculum was being taught for the first time. This occurred at the start of the first semester (pre-semester 1), at the start of the second semester (post-semester 1/pre-semester 2) and at the end of the second semester (post-semester 2). Combined with other data collected regarding the curriculum implementation, the student survey contributed to building a picture of how students might have changed during 2010.

This was a self-developed instrument specific to this context (Lodico et al., 2010). The design of the survey instrument drew on surveys developed by Kagawa (2007), Ruff and Olsen (2009) and the DEsign EDucation and Sustainability Project (Blincoe et al., 2009), which addressed the above themes. The survey measured students' intentions only, rather than actual actions. The survey included both open-ended and closed questions. I developed a draft survey that was finalised in consultation with the academic group. It was also trialled with a separate student cohort, giving the instrument face validity (Lodico et al., 2010). Students included their name on the instrument so I could compile each student's set of three surveys for comparison. Students were advised that I would be the only person who would have access to the completed surveys and that academics would only see depersonalised and aggregated versions of the results.

Statistical analysis was chosen for both the open-ended and closed questions. The open-ended nature of the statistical techniques used was influenced by the small sample size, which tended to reduce some aspects of validation. The main open-ended qualitative

question (Question 6) asked students to write four words or terms that they associate with sustainability. These responses were coded using open and then axial coding techniques (Boeije, 2010). The open coding process involved identifying a set of descriptive codes literally reflecting students' responses (Miles & Huberman, 1994). This identified 101 groups (or subcodes) across all the surveys. These descriptive codes were then coded interpretively (Miles & Huberman, 1994) into themes with 12 interpretive codes identified, referred to as "aspects of sustainability" codes (Kagawa, 2007; Wright, 2009b). A colleague acted as second coder and coded the data against the 12 codes, looking for interrater reliability (Boeije, 2010). An 80% agreement in coding three of the twelve identified interpretive codes was achieved, suggesting acceptable intercoder reliability (Lavrakas, 2008). Systematic coding differences identified between coders' approaches were clarified, addressed and recoded. Following these clarifications, the Kappa coefficient across the two coders was found to be comparable, being consistently above .8,⁴ except in one instance where it was .696 (see summary of results for Question 6 in Appendix E).

I am aware that the attributed meaning of the qualitative data as indicated in the coding is as a result of the interpretations of the coders who have to an extent a researcher bias (Miles & Huberman, 1994, p. 265) and thus is not necessarily the meaning as intended by the respondent (Hodder, 2003). For instance, without providing any context for the verb/action, it is not possible to ascertain whether students believe the actions are needed to support sustainability, are intrinsic characteristics of sustainability, or conversely related to unsustainable practice. However, this concern is mitigated by the question asking about associations with sustainability, which makes students' responses less likely to be referring to unsustainable practice.

My coding colleague suggested there may be coherence among the four terms chosen by students each time they completed the survey, which when considered holistically, provided a deeper insight into student thinking than considering each students' four responses separately. Pattern coding analysis was used (Miles & Huberman, 1994) as a form of axial coding. By considering the four aspects of sustainability codes in combination, an overarching understanding of sustainability was interpreted. In all, seven

⁴ Kappa co-efficient values above 0.75 are considered "excellent agreement beyond chance", values less than 0.40 are considered as "poor agreement beyond chance" and values "between 0.40 and 0.75 may be taken to represent fair to good agreement beyond chance" (Fleiss, Levin, & Paik, 2004, p. 604).

categories were identified from this process. These categories indicate a ranked taxonomy of students' sustainability understanding. The data was analysed to identify shifts in category over the three surveys. My colleague again acted as second coder, with Kappa coefficient across our coding against the categories of .603, .622 and .327 for Surveys 1, 2 and 3 respectively. While these Kappa values represent fair to good agreement for Surveys 1 and 2, only poor agreement for Survey 3 was found. The main difference between coding was that my colleague attributed higher order concepts to the terms students used than I did. Again, we reviewed our interpretations of certain clusters of terms, and found the terms we interpreted differently were: *responsibility* and *education*, and some professional practice-related terms (*upcycling*, *quality*, *localism*, *durability*). We agreed the difference in our coding stemmed from the context in which we saw students developing and using these terms. From my perspective, use of terms such as *durability* and *quality* related to the professional practice domain of the students' work (textile design). For my colleague, the terms were associated with more sophisticated understandings of sustainability practice. We agreed that the context of the student learning environment was the more likely overriding influence and recoded accordingly, where near identical (but one) agreement was found.

This data was further analysed to identify if a shift in the sustainability understanding category had occurred for individual students over the three surveys. New variables were created, looking at the shift between individual students' sustainability understanding category across the three surveys. This data was analysed using descriptive statistics and validated using normality tests.

A further survey question (Question 8) asked students for their thoughts on ways sustainability teaching could be improved. This question had a very low response rate and responses were descriptively coded, essentially providing a list of suggestions.

For closed questions, students were asked to agree or disagree to a series of 27 items using a five-response Likert scale (Questions 7.1–7.27). In preparation for analysis, all negative statements were reversed. Statistical analysis was undertaken using SPSS predictive analysis software (www.ibm.com/software/au/analytics/spss/) to analyse for assumptions/normality, descriptives, psychometrics and validity. Mean and confidence intervals were calculated for each item for each year level and survey. Mean and confidence intervals were calculated for grouped items, based on themes relating to the sustainability knowledge-related domain (Head), the sustainability affective-related

domain (Heart), and the sustainability skills-related domain (Hand) (Sipos et al., 2008; Sterling, 2010). The items were also grouped according to whether the item inferred an internal or external focus of responsibility for action; for example, item 8, “If I had the opportunity my clothes would all be made using sustainable methods and materials” (internal focus) and item 12, “RMIT University should only purchase fair trade products where such products exist” (external focus). An overall sum of all 27 items for each year level and survey was also conducted. Each of these analyses was also graphically represented to aid discussion in group workshops.

Psychometric statistical analysis, in the form of factor analysis that was applied to items to identify if domains/subscales exist, was undertaken for the full data set. Exploratory factor analysis across all year levels was attempted on the data. The first two analyses asked SPSS to identify five and four factors respectively; none were found. A subsequent factor analysis was done without specifying the number of factors required. Again, no significant results were returned. It is noted that the constructs applied to Kagawa’s (2007) questionnaire (environmental, social and economic) were not identified from this factor analysis, suggesting weakness in that questionnaire design or incompatibility with this study.

Confirmatory factor analysis was conducted on the constructs referred to above: Head, Heart, Hand, and Internal and External focus. Cronbach’s alpha was used as the reliability measure, showing good reliability in the case of Heart, Internal focus and External focus and poor in the case of Head and Hand. Of note was that when a selected item was removed from the reliability calculations of these constructs, both Heart and Hand showed acceptable reliability. A summary of results for Question 7 of the student survey can be found in Appendix F.

An important possible limitation of the survey is the potential for a social desirability bias by students in their responses, given that the topic is one of values and within a personal teaching context (Fisher, 1993; King & Bruner, 2000; Nederhof, 1985). This highlights the value of the internal validation techniques as described and the need to triangulate the findings with other data to add rigour to the findings.

3.4.3 Teaching observations

Observations of teaching were conducted with me primarily in an “observer as participant” role, where while I was known to the group I did not actively participate in classes (Lodico

et al., 2010, p. 117). The initial purpose of the observations was to contribute to the overall validation of the study, to evidence academics teaching the new curriculum. In practice, however, the observations also became an important part of the dialogic process between individual academics and me for considering teaching improvement and collaborative professional learning. The protocol for the observations was largely unstructured. Observations were analysed to confirm if teaching of the sustainability-related lesson occurred and was validated through discussions with individual academics. An example of the notes recorded during teaching observations can be found in Appendix G and Appendix M.

3.4.4 Artefacts

Group developed artefacts. A number of artefacts were developed collaboratively by the group as a whole or by members of the group and myself over the course of the project. These included butcher's paper brainstorming activities in workshops, curriculum materials, reports, and conference papers. The development of artefacts was for a range of reasons; invariably, however, they involved reflective practice. Validation of actual artefacts occurred in their making, in that the group generated these themselves. In terms of analysing these artefacts, they contributed to the pool of data that was sifted and interpreted and resifted over time to inform this thesis.

Field notes (journaling, diaries, notebooks and emails). Throughout the project I kept a record of my planning, reflections, observations and actions in a series of hardcopy and e-copy field notes. They span the entire length of the project and attest to the emergent way the project flowed and unfolded. My diary recorded the appointments and the days I worked on campus. My journals were primarily intended for reflection, and often through the act of reflection included planning and designing of activities. My notebooks contained my notes from meetings and discussions, and planning of activities, and also included some in-situ reflections. My journals and notebooks were at times used interchangeably. My emails – those sent by me – also provided an important record of communicating with the group as individuals and as a whole about aspects of the project, including arranging follow-up activities, as well as seeking approval from managers to progress aspects of the project in a certain way.

I have a set of three journals dating from early 2008 to 2013: journal 1 (204 pages), journal 2 (107 pages), and journal 3 (137 pages). They include my observations and reflections of the project and my involvement in it. They also record notes on the progress of the study

and thesis writing. There are also two notebooks intended to document the project's day-to-day work with reminders and to-do lists associated with my role as a facilitator: notebook 1 (192 pages), notebook 2 (113 pages). The notebooks were kept in the same way as I would document my professional role generally. These records are working documents. Excepting emails, they are rough, often messy and abbreviated, with taped-in bits of paper here and there, and sometimes incomplete notes.

To an extent, the journals and notebooks track each other chronologically, whereby activities I have documented in the notebook are reflected upon in the journal at the same time or later. The two types of books seem to complement each other in this way. At times, the distinction between the two types of record keeping is blurred because notes may have ended up in a journal or vice versa.

I read over the text of the notebooks and journals at least twice, highlighting and informally coding the text topics and themes that were transferred into the overarching Excel spreadsheet. My field notes are another form of artefact, and analysis and validation occurred in the same way.

Curriculum documentation. During the project, curriculum documentation was collected and analysed twice by myself. This occurred for the 2008 and 2010 curriculum documents. The intent of reviewing the curriculum was first to contribute to my understanding of the form and extent that sustainability learning was pre-existing in the program. Written documentation for the changed curriculum was also collected.

For the 2008 documentation, I collected the program and course documentation that was available on the RMIT website at the time, which consisted of the program guide and the Part A and Part B sections of each of the course guides. At the beginning of the project (late 2008), this documentation was supplemented in relation to some courses by individual academics providing me with teaching project briefs that were given to students during the semester. Towards the end of the project, I was given further course documentation by five of the seven academics teaching into the program.

For the 2010 documentation, I similarly collected program and all course documentation that was available from the RMIT website, and was provided with a selection of course teaching project briefs and assessment rubrics for courses taught by five of the seven academics teaching into the program. A sample of pre and post curriculum change documentation is provided in Appendix H.

To review the formal curriculum for the sustainability learning I first needed a framework for what I saw as sustainability-related learning and teaching. Given the variations in definitions of sustainability learning and teaching, I undertook to use as broad an interpretation as possible when looking at the written curriculum. I looked for references to content learning of one or more of the three dimensions of sustainability, that is, environmental, social, economic. I also considered the range of competencies attributed to sustainability learning, that is, using competencies found in relevant studies (e.g., Barth, Godemann, Rieckmann, & Stoltenberg, 2007). It is noted that a number of the sustainability competencies can be found in the course documentation but these do not apply to sustainability contexts. Sustainability competencies were attributed to the curriculum where the application of the competency applied to sustainability-related content and/or contexts. I determined to review the curriculum by broadly looking for references to environmental, social and economic content themes within the learning goals, learning outcomes, learning activities and assessment. Competencies associated with sustainability learning needed to be related to sustainability content to be considered as contributing to the sustainability curriculum. This is an approach suggested in a module to support integrating sustainability into the curriculum (De la Harpe & Wahr, 2009).

The review of curriculum documentation done in 2008 was incorporated into the SWOT analysis and reported back to academics for member checking.

The dialogic nature of the action research process we used provided another form of member checking for the curriculum. Throughout the project, we would review curriculum documents and discuss, as a group and in 1:1 settings, how academics saw their courses and their teaching changing.

3.4.7 Evaluating student work

Student work submitted for assessment was reviewed independently with the consent of students and academics. The review examined the ways and extent students had addressed the sustainability-related learning within courses. This data was used in two ways. First, the data contributed to validating students' engagement in sustainability learning. Second, the data provided additional feedback to academics on student learning and teaching approaches.

The evaluation was conducted by two reviewers (myself and my supervisor), consistent with the view that data can be analysed outside the group within action research (Creswell,

2005). One sustainability revised course per academic teaching during the second semester of 2010 (five in all) and one unchanged course of another academic in the project were reviewed. The review considered the consistency of the student work with the sustainability-related learning outcomes, learning activities and assessment expectations. A generic checklist with rating scales was developed and used by reviewers.

We were given access to the student work after it had been formally graded by academics. For each course we first clarified the elements of sustainability-related learning the course aimed to achieve for the course documentation and collaboratively reviewed a few pieces of students' work to develop and confirm our reviewing techniques. For instance, one course asked students to (1) select an aspect of sustainability, (2) identify an idea/issue/message, and (3) design a printed fabric that expressed the idea, issue or message. These elements could be concrete (e.g., research was presented) and/or conceptual aspects (e.g., the fabric conveyed an idea, issue or message).

At times, in reviewing the course documentation, we found an unclear relationship between the stated learning aims for the assessment task and the assessment expectations. In these cases, we drew on my understanding of the course and the assessment task to clarify the review focus. We included this clarification in the feedback for academics we provided later. In the case of the course with no specific sustainability learning, we reviewed the student work for any reference to sustainability we could identify in the student work.

Using the course-populated checklist we individually considered the student work without conferring on our observations. Each student's work was reviewed, identifying the aspect/s of sustainability covered (environmental, social and/or economic) and the extent to which the course sustainability criteria were met (giving each a score of high, medium or low). We also noted how we interpreted the student's work. During the review, we revised the process to include a further evaluation criterion: whether the student had responded to the assessment task using a conceptual, literal or disconnected interpretation of sustainability. We noted that while students met the criteria, there was a stark variation in degrees of sophistication and complexity in the work that was worth noting.

Having reviewed the student work independently, we then compared our results and calculated how these correlated. We discussed themes and issues arising from the reviews and prepared feedback for academics where we summarised our observations. We later

met with and discussed these observations with individual academics. These discussions with academics simultaneously provided a form of member checking with academics about the student assessment, as well as an opportunity to critically reflect on a range of learning and teaching practices.

The reliability of this data collection was provided by having two reviewers achieve strong correlation in results. The data was validated through the process of the post-review discussions with academics. A summary of the results of the evaluation of student work can be found in Appendix I.

3.5 Evaluating the Study

Evaluation of the study needs to determine the contribution of the embedded model to the professional learning of the academics involved. To do this, the evaluation is presented from two perspectives: the internal perspective and the external perspective. Consistent with action research, evaluation is undertaken from the internal perspective: what has been achieved in terms of the participants' needs and according to the principles of action research. The external perspective considers what the embedded model has contributed and hence requires evaluation of the project as a professional learning intervention. These two evaluation perspectives have distinct purposes, yet these are mutually reinforcing, sharing a lot of evidential data. In addition, the evaluation strategy overall is aligned to the context, which while limiting generalisability of results, allows for more nuanced outcomes (Coghlan & Brannick, 2010; Kreber & Brook, 2001).

3.5.1 Evaluating action research

The evaluation approach of action research is consistent with the principles of the methodology and paradigm itself (McNiff & Whitehead, 2010, p. 32). Action research contributes to and therefore seeks to evaluate the development of local policy and practice according to the action principles, as well as broader theory development (Burns, 2000).

In terms of developing local practice and policy, demonstrating quality and rigour requires consideration of “how the data are generated, gathered, explored and evaluated, how events are questioned and interpreted through multiple action research cycles” (Coghlan & Brannick, 2010, p. 14). As discussed in section 3.3.3, validation of action research refers to internal validation (Burns, 2000). This considers the quality of the process in terms of the characteristics of quality identified in section 3.3.7 of this chapter. The quality of the

project seeks authenticity for participants (Zuber-Skerritt & Fletcher, 2007, p. 423). As such, evaluation is embedded into the cycles and undertaken in situ throughout the project:

The criterion of success is not whether participants have followed the steps faithfully but rather whether they have a strong and authentic sense of development and evolution in the *practices*, their *understandings* of their practices, and the *situations* in which they practice. (Kemmis & McTaggart, 2008, p. 277)

Applied to this study, the group considered what changes were achieved and how these were achieved. Group discussions during workshops and surveys of academics conducted during and at the end of the project provide supporting evidence to evaluate this aspect of the study. These are described within the cycles reported in Chapter 5.

Broader theory development is validated by the quality and rigour of the group process, described above, as well as the quality and rigour of reporting the research overall (Zuber-Skerritt & Fletcher, 2007). In this case, the overall report includes the evaluation of the professional learning described in the following section, and the discussion of the broader contribution of the study, described in Chapter 6.

3.5.2 Evaluating the professional learning

In relation to evaluating professional learning, Kreber and Brook (2001) suggest an evaluation strategy be informed by two considerations. First, there is alignment between the professional learning strategy (i.e., the embedded model) and the evaluation strategy. Second, the evaluation strategy focusses on an appropriate level of impact, of which they suggest there are six possibilities, referred to later in this section. Consistent with the goals of sustainability learning, the evaluation framework needs to review the achievement of transformative learning, which results in action and change.

A professional learning experience is likely to have multiple outcomes, especially a project that is conducted over an extended time and related to many aspects of teaching. The outcomes of professional learning, and therefore the validity of the embedded model, are gauged on a number of evaluation levels, ranging from temporary attitudinal changes to lasting change in practice.

Kirkpatrick and Kirkpatrick (2006, 2013) identify four nested levels of evaluation to apply to individual professional training activities. These are reaction, learning, behaviour and results, as follows:

Level 1: Reaction – To what degree participants react favourably to the learning event.

Level 2: Learning – To what degree participants acquire the intended knowledge, skills and attitudes based on their participation in the learning event.

Level 3: Behaviour – To what degree participants understand what they learned during training when they are back on the job.

Level 4: Results – To what degree targeted outcomes occur as a result of learning event(s) and subsequent reinforcement.

While the Kirkpatrick and Kirkpatrick model was originally developed to evaluate discrete training programs, it is seen as applicable to a range of adult learning modalities that can include extended, open-ended projects (see, e.g., Anderson & Christiansen, 2004; Draper, 2012). As such, individual activities within the project, while aiming to promote professional learning, have not been evaluated separately. More appropriate, and consistent with the intent of the embedded model, is to evaluate the overall professional learning experience; that is, the learning resulting from the project as an integrated, open-ended and holistic professional learning opportunity, considering both unanticipated and anticipated outcomes (Kember, 2002).

Vella (2001) identifies three similar outcomes arising from a learning experience that can also translate to a learning program. These are: “(1) learning that occurs during a session, (2) transfer (use of new skills, knowledge, and attitudes in a workplace setting), and (3) impact (the change in the organization’s approach brought about by the learning and transfer)” (Vella, 2001, p. 21).

Kreber and Brooks (2001, p. 101) identify six forms of outcomes to be evaluated in relation to evaluating professional learning. These include changes affecting a range of stakeholders:

1. participants’ perceptions/satisfaction with the programme;
2. participants’ beliefs about teaching and learning;
3. participants’ teaching performance;
4. students’ perceptions of academics’ teaching performance;
5. students’ learning;
6. the culture of the institution.

Combining the evaluation levels of Kirkpatrick and Kirkpatrick (2006) with the evaluation considerations of Kreber and Brooks (2001), and contextualising this to the project provides a comprehensive framework to evaluate the professional learning arising from the project and subsequently the embedded model across a number of levels and groups of stakeholders.

As already discussed, earlier studies of sustainability-related curriculum change projects limit descriptions of project outcomes to students' perceptions of their learning and/or academics' teaching and participants' perceptions of the curriculum change project and their self-reports of learning. This is entirely consistent with the idea of internal validity where those participants regard such an evaluation as appropriate. The forms of impact evaluated for this project reflect the more critical stance taken within the group's own professional learning approach. As such, it includes the need to check or analyse students' learning and shifts in understandings to inform and enhance their teaching practice. Moreover, as the evaluation framework considers higher levels of evaluation (i.e., behaviour and results), teaching performance and students' perception of teaching performance, therefore, as suggested by Kreber and Brooks (2001), has not been included in the evaluation framework in this instance as quality of teaching performance is inferred.

In summary, the evaluation framework considers the following outcomes associated with the project.

Results:

- participants' perceptions/satisfaction with the project.

Learning:

- participants' beliefs about teaching and learning;
- participants' beliefs about sustainability learning.

Behaviour:

- curriculum design;
- participants teach the new curriculum.

Results:

- students' learning;
- academics' capacity to bring about sustainability related curriculum change (including transformative learning);

- local policy and practice;
- institution culture.

The higher order levels of evaluation models consider the resulting changes arising from the professional learning experience overall. These are the embedded, lasting impacts and are of greatest interest to this study in that the goals of the study are to bring about transformation and lasting change through the curriculum change process. The “learning” level, by definition, would at first seem to include the transformative learning arising from the project. Transformative learning, however, has its inherent focus on change and emancipatory knowledge (Cranton & Hoggan, 2012) and has therefore been included in the higher order, impact level of the taxonomy. Notwithstanding, it is recognised that academics can only bring about change when they are empowered to make change; however, in this case, the project has sought to provide a learning environment to promote change in practice.

Given that “... few published reports of the outcomes of comprehensive [curriculum] evaluations are evident” in the literature (Harris et al., 2010, p. 477), this study is unusual as it reports on the impact of learning at multiple levels, focussing on change impacts. In this study, the overall impact of learning is discussed in Chapter 5 by considering the impact arising from the group’s learning experience; that is, for the academics, myself, and subsequently, the learning of students. The contribution of implementing the embedded model is then related to the outcomes identified in this evaluation.

3.6 Chapter Conclusions

The embedded model presented in the chapter is a promising professional learning approach to support academics to embed sustainability in their curriculum. The chapter demonstrates how the principles and practices of action research strongly align with the embedded model. Action research and the embedded model have been shown to be closely aligned and therefore action research is an especially appropriate methodology for research curriculum change. As proposed by Hubball and Gold (2007, p. 10):

Action research methodology is central to scholarly approaches to curriculum practice ... [by engaging academics] in reflecting on and initiating positive changes to course design and curriculum practices. Action research internalizes theory and practice through a systematic and cyclical process of inquiry that involves hypothesis testing, planning, observing, analysis, and action.

Consequently, a research design using action research while applying the embedded model to undertake sustainability related curriculum change in a single degree program was presented, including data collection methods and an evaluation strategy.

Chapter 4 describes the first step in the action research study: the pre-step findings of the study. This includes the background to my role at RMIT, my initial contact and access into the School of Fashion and Textiles, and the analysis of data gathered from academics and other sources to inform the design of the project.

Chapter 4: The Pre-Step: Understanding the Context; Meeting the Group, Starting to Build Collaborative Relationships and Identifying the Need for Change

4.1 The Pre-Step

The project to embed sustainability took place among the academics teaching into the TD Program at RMIT. It occurred within the day-to-day workplace context of the academics teaching into the program over a number of years. RMIT's policy and practice relating to sustainability learning is described in previous chapters. This section describes the pre-step for the curriculum change project, which involves understanding the context, identifying its purpose and dialogically constructing relationships to support the project (Coghlan & Brannick, 2010). The pre-step sets the scene and the starting point for the project and supports me, as facilitator, to better understand the circumstances the project will be located within and shaped by.

The pre-step describes the complex and multifaceted context of the project. The context included RMIT as the organisational setting, the local School and program context of the curriculum change, the TD program curriculum, and most importantly, the perspectives of the participants. It demonstrates how there were multiple interpretations of the context and issues to be addressed (Cherry, 1999; Coghlan & Brannick, 2010).

The purpose of this stage of the project was multifaceted. Indeed, it was to form a clear idea of the context, but equally important was establishing a working relationship between myself and the group. The approach I used to collect the pre-step data supported this relationship development. To collect large amounts of data using intrusive methods would have been unnecessary and possibly counter-productive.

The pre-step data presented in this chapter was gathered before the curriculum change project commenced. The supporting evidence used in this section used the following data sources:

- individual interviews with academics (AA–AG), including the program coordinator (PC), conducted prior to the start of the project;
- an interview with the Head of School (HOS), conducted prior to the start of the project;
- the 2008 TD Program curriculum documentation;
- my journal notes.

Details of data collection and analysis techniques are described in Chapter 3. Unless specified, all quoted extracts from either the HOS, PC and academics are from interviews conducted prior to the project's formal commencement.

4.2 Meeting the People

I used my informal channels within RMIT to find a group of people who saw a need for sustainability-related curriculum change. I met the Head of the School of Fashion and Textiles in July 2008 through an existing informal network of academics interested in sustainability learning. At the July network meeting, I presented a seminar on RMIT's sustainability-related graduate attributes and my research objectives. I also asked for expressions of interest from anyone interested in embedding sustainability in their program curriculum.

4.2.1 Head of School

The Head of School (HOS) supported the idea of undertaking a project within his school and suggested to me the TD Program as a potential program to embed sustainability. The HOS then consulted with the program group and confirmed they were interested in introducing sustainability learning in their program the following year. The HOS introduced me to the Program Coordinator (PC) and suggested I was available to work with the program group. The PC saw the project as potentially trailblazing a shift towards greater sustainability for the program. The PC then introduced me to the program group.

The following interview extract shows the HOS was personally passionate about sustainability:

HOS: I see it [sustainability] as leaving a good heritage for future generations in conjunction with those areas and particularly society, which is the hardest one I think. But it still allows the human condition is for ongoing economic development. It's only in the last century it's started to change and particularly in the last 50 years where I think humans realised we're not the only ones here. There are other species for example.

As noted earlier, while sustainability was present in some policy areas of RMIT, it was not mandated and had a low profile within the university and, in practice, was relatively untested. The HOS was not required or compelled by RMIT to make sustainability a focus within the School. The HOS, therefore, by inviting me to work with the TD Program, showed commitment and leadership towards sustainability learning.

4.2.2 The project group

The project group was made up of seven academics, including the Program Coordinator, employed by the School of Fashion and Textiles to teach into the TD Program. Each group member coordinated one or more courses and taught the bulk of classes for their course/s. Each academic position included an expectation to teach, to undertake program-related administrative tasks, to engage with industry, and to undertake research. Of the seven academics, two held part-time positions and five were full-time. To protect participants' identity, gender is not provided; moreover, gender is not considered a significant factor in such work (see, e.g., Berenguer, 2007).

My first impression of the group was a very positive one. They were welcoming and friendly, very generous with their time and accommodating towards me. I sensed a genuine curiosity about the project, along with an understandable slight reticence that I attributed to not knowing exactly what the project would involve.

All seven academics had been students of the programs themselves. A number of the group members held additional qualifications in other disciplines, including psychology, education, environmental science, and fine art. In 2008, two academics were engaged in PhD studies and two were engaged in Masters studies within the TD discipline. The other three academics considered undertaking postgraduate qualifications in the future.

In addition, casual teachers were employed to teach some classes. Casual teachers were usually industry practitioners who taught a small number of hours per week during semester. Casual teachers tended to teach practice-based classes. They were not expected, nor paid, to undertake administrative work, research or curriculum development. Casual teachers were not directly involved in the project.

Each academic in the group had a strong design industry background, with multiple years of professional experience. Academics talked about a range of changes that they had been involved in professionally as textile designers, in their teaching, as well as personal lives. They saw working with change as core to their practice. Creativity, practice-based learning and double-loop learning (Argyris & Schön, 1974) were seen as standard approaches in their work, supporting them to adapt and change their practice:

AA: There's a sort of culture within our unit ... that we're constantly revising our projects, we're constantly updating our expectations. Obviously working with technology it's always changing, there are different skills that students need to be

learning and we need to be learning, so, um you know, instinctively I want to review it, but instinctively also, I want to make sure that I've got some good models that are there and working for the students.

Zuber-Skerritt (2002) sees the action research workshop as the starting point for collaborative or team work. In this case, the academics had a pre-existing, established collaborative working relationship. Academics regularly collaborated around program administration and student welfare; however, the interviews referred to them developing their courses largely in isolation. In addition, academics' workstations were co-located in a large office within the building where a substantial amount of their teaching was undertaken, excepting the Program Coordinator who had a separate office in the same building.

4.3 Need for the Project

Academics' motivations to be involved in sustainability related change arose from a mix of reasons, including concerns about the textiles industry, a sense of commitment to and change within the discipline, and for their own personal reasons.

4.3.1 Industry influences

Academics were very conscious their industry has a poor environmental track record, being seen as big polluters, with unsustainable practices tending to be the norm. They referred to some notable exceptions. Sustainable Living Fabrics was seen as an Australian exemplar and the UK-based company Marks and Spencer was seen as working on a completely sustainable supply chain model. Overall, however, industry was seen as lacking leadership to change and move towards more sustainable practices locally and globally:

AB: We have all acknowledged that the textile industry isn't particularly good to the environment and isn't currently sustainable.

AA: Textile design has got a pretty dirty reputation from a sustainability point of view.... The actual nasties that go into the textile industry are big as far as I see it.... I don't see them as necessarily being dealt with in the wider market place with great thought ... we still have third world countries doing most of our manufacturing ... so in a way we get our dirty work done offshore.

As a priority, academics saw barriers to industry operating sustainably as primarily driven by economic considerations. Textile businesses were not necessarily disinclined to operate more sustainably, but were ill-equipped and/or perceived sustainability as costing more:

AE: Money is a huge issue and sometimes being sustainable does cost money and it [sustainable practice] is not [the main concern]. The company's first priority is to make lots of money, then something is going to give.

Academics also referred to an "old school" mindset operating in some areas, where businesses' capacity to engage in significant change was viewed as limited by industry. This included lack of sustainable solutions; for instance, the HOS referred to the challenges of dyeing organic cotton:

HOS: The only [dye] that it was fast on was cadmium-based dye... it is not a poison to the consumer, but the effluent that goes out ... is one of the substances that the EPA [tightly controls].

Yet, academics indicated if costs were comparable or more competitive using sustainable practices, or if standards were legislated, industry would support sustainable practices. The industry was potentially open to sustainable practices; the challenge was to present the alternative, more sustainable options:

AC: There is talk about it [greater sustainability] but there's not necessarily an understanding of how to apply that practice.

Academics also indicated the textile industry or discipline more widely had not lobbied for graduates to leave the program with sustainability knowledge, skills and experience. Nor was there an obvious historical association with sustainability. Rather, it was academics who identified the relevance of and created the impetus for the change in this area.

Academics saw themselves, however, as having a two-way or mutual learning relationship with industry. Among academics was a commonly held view that they had a responsibility to support industry to become more sustainable by growing sustainability expertise within the profession. This would be achieved through both providing more sustainably skilled graduates from the TD Program and through the interactions between academics, students and industry to address:

AB: the social, ethical, plus environmental consequences of our actions ... and the globalisation of our industry

Their engagement with industry also supported their own learning in regard to new developments:

AE: When we work with industry, that's when we get the privilege of seeing new developments.

In relation to the TD Program directly supporting learning and change in industry, academics welcomed the possibility of engaging industry through the curriculum change project:

AF: Then can we look at ways of actually engaging industry a little bit more in perhaps some of the projects that we might be doing or the outcomes or sharing the outcomes that the students might be researching?

Academics referred to a handful of student projects they had run where textile businesses collaborated and where students critiqued practices in terms of sustainability, highlighting both good and poor practice. These student projects were also seen as an opportunity to expose industry to sustainability-related issues in TD. The challenge for academics was, in the light of industry's reputation, to remain critical of industry practice and to be aware of companies' overt or inadvertent "green washing" of their products for marketing purposes:

AC: When we drilled down with the client [industry], they actually didn't mean sustainable [product], they meant the idea of being eco-friendly, so being green and breezy and the lifestyle ... [which was] not really a practical product outcome because of the way they manufactured.

At this stage of the project, the academics' views of industry and the need for change within industry was a strong driver for their involvement in the project. They have a personal commitment to the change and, as indicated by Kotter (1995), this is the critical starting point in successful change.

4.3.2 Student considerations

In relation to their teaching and the TD Program, academics believed they had a responsibility to prepare students to be ready to work in the TD industry and to take on leadership roles within industry, and to anticipate and prepare for future issues that clearly included sustainability:

AB: Ultimately, we are providing the next generation for industry.

AE: We have a responsibility to, maybe, instil some understanding around sustainability so when they go out they can implement change.

Academics saw a clear relationship between developing their own sustainability practice and what they hoped students to achieve. Academics indicated they needed to practice

more sustainably as role models to their students and industry generally to avoid the label of green washing in their teaching of sustainability:

AC: I don't want to turn out my graduates thinking they are being green and it's green washing ... if we are going to hold ourselves up as practitioners of [sustainability], then we have to do it.

AB: ... our graduates, they are in a position potentially in a few years' time to be in a role of management of some level and to be able to be in a place of influence about decision-making and I'd hope that they would reflect back in terms of thinking about these issues and the complexity of these issues ... [and] say "well actually you need to be thinking about this, this also needs to be on the table" and if it's not on the table they are actually bringing an awareness to the company about sustainability ...

4.3.3. Personal perspectives

On a personal level, many academics saw a strong need for sustainability and were committed at some level to personally practicing more sustainably; that is, as a personal responsibility that extends to all aspects of life:

HOS: ... it comes back to society and comes back to the ordinary person as a cultural way of life whereby it has to be embedded in the way we operate.... I sincerely believe that ... we need to pull our heads in and do something about it and I believe the only way to do that is through the next generation. And we've just got to keep pushing at it and it's not a political agenda. It's just, we have to change our way of life.

AC: It's almost the personal political statement that you can make or think, you know, the other phrases like think global, act local.

AB: ... in terms of that political agenda as well as, you know, economics, environmental, social.

4.3.4 The school and university influence

Academics saw the school's position as a stronger driver for influencing and supporting sustainability compared with RMIT's position. Academics felt supported by the school and program leadership.

PC: Our school is seriously looking at sustainability from an L & T perspective – creating something that is unique to this campus. Ethical fashion programs are big news [overseas]. We have yet to see them developed here. Our big picture is to

develop Brunswick as the green campus base-space, we want TD at Brunswick to start the process rolling. (Extract of PC's email to Facilitator, September 26, 2008)

AB: ... in terms of support from management ... I think that's really important as well and I think that we do get that and we also get that freedom of, ... we do get to design our course ...

AA: I know nothing beyond the confines of [our] office really.... I don't know what the overall university position is other than the general rhetoric I guess that one would hear around.... And I know that [the HOS], from what I've heard said, is keen on looking at innovation and all those things and is not frightened of having a go at stuff.... So overall I would see that we are in an environment that would encourage it ... so that is positive.

While the HOS was aware of initiatives within the university, in terms of RMIT's learning and teaching sustainability framework, academics made no comment to suggest they were aware of any efforts specifically by RMIT to promote sustainability, but sensed it was generally valued within the organisation:

HOS: ... nobody knows about it ... [they] are doing lots and lots and lots of stuff, or little pieces, ... they are coming to the realisation that they need to take a much bigger picture approach, rather than just fiddling around at the edges.

Academics, however, also perceived unclear or even inconsistent messages coming from RMIT in relation to learning and teaching as well as operational sustainability on campus. Academics identified individuals within RMIT who worked to support the sustainability curriculum but considered this was not systemically supported, nor was there adequate support.

Academics saw a number of areas for improvement at the university level, stressing the importance of being able to demonstrably practice sustainability to promote sustainability learning and frustration where current practices might be counter-productive:

AC: There was a recycling bin in the courtyard that got taken away because it was too hard for the property services people to separate out because of people putting rubbish in the recycling bin. So they just took it away. And that was only four years ago ... maybe that's where I'm a bit cynical ... if we are going to hold ourselves up as practitioners of this then we have to do it.

They felt unsustainable university practices or impediments rendered their efforts less effective:

AB: How does the university, how does the school, how does the program support sustainability? ... I am in a class... talking about the Garnaut Report on climate change and it's winter but it was a mild day and everyone's in T-shirts or singlet tops because ... the heating is so high, you can't open a window.... How are we an example to students that we are actually taking this seriously?... I think there are certainly actions taking place but it is those sorts of things that I think are important to be able to show students we actually lead by example.

They also saw the project as potentially providing an opportunity to promote more sustainable practices within the university:

AG: The program's sustainability focus could drive and lead green campus approaches, for example, rainwater storage and use, and transport to and from campus.

4.4 Understandings of Sustainability Within the Group

Academics described their understanding of sustainability in a range of ways. When asked what sustainability or sustainable development meant to them, academics' responses had a number of commonalities, but there were also some interesting points of difference between them. Following is my interpretation of each academic's understanding of sustainability in general terms, based on the whole of the extended individual interviews. I include illustrative quotes from transcripts.

Academic A: Academic A used concepts such as mindfulness, knowing and awareness of the impact ("footsteps"), suggesting sustainability has a consciousness to it. For this academic, sustainability refers to the use of resources and environmental impacts in personal and professional contexts. The multiple and interrelated personal and practical factors influencing resource use and environmental impacts creates complexity and makes sustainable solutions or relatively more sustainable solutions challenging to find. Sustainability, however, also has a connotation of personal responsibility for finding ways to minimise and mitigate environmental impact and to act on these:

The first word I wrote down was mindfulness. It's about being ... aware of the impact that you have in your own environment, on how we treat our environment ... when you turn the tap on and you run the water you're aware of where it goes and you're aware of how much might go out the tap, depending on how long it's on for and you're aware that it's not recycled water, that it's drinking water and so on.

It's the sense of the cradle to the grave thing, ... knowing that when an object is created it uses X amount of energy and X amount of materials and so on. Its life is such and such and then how is it disposed of at the end of its life.

I think sustainability is about getting awareness to a point where it's not just thinking about it but actually doing some stuff, making some physical changes.

Academic B: Academic B saw sustainability as an integration of the three dimensions of sustainability (economic, environmental and social dimensions); however, the practical examples referred to are located in the environmental domain. Issues of sustainability are complex and many factors are interrelated, therefore there is a need to take a holistic view. Sustainability is a legitimate and necessary academic pursuit associated with a responsibility to critically question the status quo. There is a need to be proactive in the face of established evidence supporting the argument to change, to be aware of and take responsibility for the consequences of one's actions. This responsibility applies to one's actions locally, within a global context, and with a particular focus on the textile industry, extending to the education of future textile designers:

It is the social, ethical, plus environmental consequences of our actions, ... and the sort of globalisation of our industry.... What is the impact of that?

[It is about asking] "why are we interested in this?, why is this important?". And that is drawing back on my previous degree ... I am able to talk about that interconnectedness of things and ideas ... in terms of the political agenda as well as, ... economics, environmental, social.

Academic C: Academic C sought to integrate personal sustainability practice into their day-to-day life and saw sustainability as also applying to industrial considerations. Both of these areas of application had an environmental focus. Sustainability involves thinking deeply about environmental impacts and requires self-determination and a commitment to change:

... so I grew up with [sustainability as an alternative lifestyle] embedded in me.... But I'm more interested now as a designer in industry or as an educator to actually think about, "okay that's the local personal sort of approach to sustainability, but how do you apply that in in the industry?"

I think it is about your own impact on the Earth and not just your personal impact but ... it's almost the personal political statement that you can make or think, ... the other

phrases like ‘think global, act local’. [I am more concerned] about what kind of a message I am leaving.

Academic D: Academic D associated sustainability with preserving or maintaining over time. The need to be aware of impacts and consequences of actions is integrated with acting responsibly to maintain the environment primarily. The example chosen is an industrial one relating to the production and distribution of goods. This is achieved through greater understanding of design and production processes that needs to be deconstructed, critiqued and changed in order to achieve better outcomes:

It is a process that can be maintained, so rather than just doing something for the short term without fully understanding and being aware of the consequences, you understand the consequences of what you are doing. So in terms of looking at sustainability for the environment, being aware of the full life cycle of the product and understanding where it comes from. How it comes into being, if it is a product that is grown, how it is grown and what is required to make it grow and then how it is harvested, and how it is processed, who processes it; is it done in the one spot or does it have to move all over the world, that kind of thing, so just understanding the full life cycle and I know that that is difficult to do for everything, but at least knowing that, I guess if you can at least be aware that if you have an understanding of what the life cycle is you can perhaps educate yourself around each of those stages and maybe be better for it.

Academic E: For Academic E, sustainability is a significant phenomenon needing to be addressed. It is broad and complex but not necessarily definable. It is clearly integrated and linked to a person’s lifestyle with the onus on the individual to take responsibility for their lifestyle decisions. This integration of sustainability practices extends to a strong reference in this academic’s professional role to using the environmental dimension and focussing on processes and materials and at the same time recognising the tensions that exist for practitioners who are concerned about sustainability. This academic incorporates a role for ongoing learning and active research into their understanding of sustainability and with that, an expectation to change their understanding over time:

It means a lot of different things to me. I think it is kind of quite a broad thing ... it is your lifestyle and the way you live and the way you use things and the way you interact with your environment, I think that’s quite a big issue. When it comes to textiles ... I am always teaching students about ... quality is quite a big issue because once ... things are well made and well produced and well designed, they will last

longer and they will survive and you know there isn't a need of updating as often. But as I said, that does bring those issues if you are not selling every season, then you are kind of losing something within that.

You know, there are things that you kind of start to learn more and read more and see more and who knows, I might have a totally different idea of sustainability next year.

Academic F: Academic F saw sustainability through a primarily holistic TD practitioner lens where the design process considers the whole lifecycle process, including the purpose of and need for the object being designed. This has a practice-based environmental focus; however, reference is also made to a growing awareness of the social dimension. Sustainability includes personal lifestyle decisions and awareness of an individual's impact. In this understanding of sustainability, sustainability practice is supported by and includes the notion of "transparency", which brings together the ideas of critique and questioning and also the complex and multilayered nature of the problems or issues needing to be addressed. This is a very visual representation of sustainability that includes the term "holistic", and I had the sense this person very much understood sustainability as a framing concept for looking at and making sense of the "big picture", or having an overview of a situation:

It comes down to a lot of different things because I think within the way that we design, we can design sustainably and that might just come down to designing a product that is functional, that has longevity, that is likeable, you are not designing product that is just going to sit on the shelf and not be used and not be sold. I mean, I have looked at it and addressed it from that sort of angle I think in terms of designing sustainably on a creative kind of level. But also in the development stage, so that the way that you are designing the things that you are using through to I guess, the lifecycle and the use of what it is that you are designing, so looking at sustainability from a design area and then I guess on a personal level, you know, there's a whole lot of things that are just the way that you live and impact that you make, but the more reading that I am doing now, I am starting to see that sustainability can even be referred to the way that socially, the way that you behave and culturally, the way that you behave as well, so I don't think that it necessarily all has to do with the environment.

It might be reliable. I mean the other thing that I've been realising is that when they talk a lot about transparency, for that idea of being able to look through all the layers and see what is going on and that it is important for people to be open about what they are doing, so I guess that is why there is a lot of information out there now as well.

And also that because there is no solution, or one answer or one way of doing something, that there has to be all these different or diverse avenues to follow I guess.

Academic G: For Academic G, sustainability was viewed in relation to the program. The program was seen as already raising and addressing environmental considerations in terms of TD practice and impacts, with the potential to do more. Academic G referred to other dimensions of sustainability in general terms, without specific reference to the program:

There is a holistic view of sustainability running across the program, not just the formal curriculum. Including reduction of paper usage by (increasing) use of Blackboard (online learning), considerations of waste treatment and disposal and planning an environmentally aware learning environment (e.g., new sinks and waste treatment facilities)... A key message to students is the need to consider the impact of one's actions upon the environment.

Sustainability is not cost cutting, but social consciousness, political and community awareness.

A summary of the aspects included in academics' understandings of sustainability is presented in Table 4.1. All academics in some way referred to sustainability as involving or requiring an awareness of and/or the mitigation of the impact of their decisions and actions. At this point in the project, and similar to other research (Cotton et al., 2007), academics largely viewed textile design-related sustainability through an environmental focus, with some social and ethical implications.

All academics saw sustainability as relevant to the work of the textile designer. They all held a strong commitment to include sustainability in the program, which is a much higher proportion than found in other research (Cotton et al., 2007).

Early in their response to the question of how they understand sustainability, all academics referred to their practice as textile designers and academics. This is unusual, for as noted by Reid and Petocz (2006), more often academics view sustainability and their teaching as separate entities. Textile design academics seem to relate and locate their understanding of sustainability within the discipline of TD, textile industry practice and their teaching practice. This suggests another powerful and ready point of engagement in the curriculum change project as academics had already problematised issues of sustainability and identified a relevance of sustainability to their curriculum in practice. That they have made this connection so readily may have something to do with the context of the question, in that we were discussing the project relating to their profession. It is clear, however, from

how quickly they moved to discussing sustainability and TD together, that these concepts are immutably intertwined and that these academics prioritise these above their personal manifestations of sustainability practice; for example, what they do at home.

Table 4.1: Summary of the Aspects Included in Academics' Understandings of Sustainability

Understanding of sustainability refers to ...	Academic A	Academic B	Academic C	Academic D	Academic E	Academic F	Academic G
Personal practice	✓		✓		✓	✓	
Industry practice	✓	✓	✓	✓	✓	✓	✓
Environmental considerations and concerns	✓	✓	✓	✓	✓	✓	✓
Awareness of multiple dimensions (social, environmental and economic dimensions)		✓				✓	✓
Personal responsibility or ethic	✓	✓	✓	✓	✓	✓	✓
Undertaking action/change	✓		✓		✓		
Learning and developing one's ideas and supporting others to do this also		✓		✓	✓		✓
Maintaining and preserving				✓	✓		
Taking a holistic view and recognising the interconnectedness of multiple elements and factors		✓				✓	
Having an awareness of the impacts of one's actions and/or decisions	✓	✓	✓	✓	✓	✓	✓
Questioning and critiquing ways of doing things		✓	✓	✓		✓	
Recognising and responding to complexity	✓	✓			✓	✓	
Recognising it as an issue needing to be addressed	✓	✓	✓		✓		
Recognising it as a challenging issue	✓	✓			✓		

4.5 Learning and Teaching Approaches

Academics described the learning and teaching approaches and strategies used in their courses as primarily learner centred and project based. In the main, courses were taught in a studio setting where students researched, designed, made and trialled a TD product developed according to the project brief provided to them. Students evaluated their product and the process they used to make it, and presented their findings to others for assessment. This approach was seen as consistent with how textile designers work in industry.

In classes, academics provided short, just-in-time presentations on TD theory, skills and practice relevant to the project stage students were currently working on. Students received feedback from academics and peers, as well as occasional industry-based practitioners at times throughout the project. Students were generally assessed on their research, their design process, their final product and their presentation of their work.

During the initial interviews, academics shared their positions on learning, teaching and sustainability in their curriculum. Academics' espoused approaches to teaching, however, may differ from the actual approaches they use in different contexts (Eley, 2006). Nonetheless, a small number of classes were observed that aligned with the approaches academics described. In the absence of a comprehensive review of teaching practices used, these self-described approaches are taken on face value:

AE: ... I think that is the key thing to teaching really, what do you want them to get out of it and how do you get there and then how do you see if it has worked? And you do it naturally, I don't think you always formalise it, but you actually do ... that's what assessment is about, if you have got a project and you go "oh, she didn't really understand this at all, what is this bit, no, she didn't quite get it did she?" or "oh, yeah, it has come together".

AB: And every year you have a different personality type within a group, sometimes the groups are very talkative, other times ... you throw a question out, sometimes the group can just "no reaction" and it is like ... I'm asking a question, I am wanting someone to start a discussion and I've sort of worked out over the years, okay, if I want to get a discussion happening it is better to break them into smaller groups.... And for me, being the first time I have run that sort of project, for me it is sort of like, I am at that point of needing to reflect and think about "well what improvements, are there, different ways of delivery, was the timing right for that project, how could it be improved?"

AA I was tweaking it at the edges and didn't do a lot of change and next year I'll probably well, some of the broad outlines of key competencies I will revisit. I want to have a look at the order of delivery, degree expectations, pace of learning, those sorts of things for students, because I want it to be hard but not too hard to be, you know, overwhelming and there's one project in particular that we run a joint project between textile studio in second year and computer-aided design course, which caused quite a lot of heartache for the students this year and I don't know if that was good heartache or not yet, so once we're finished teaching I want to have a look at it.

AB [of students]: "I want you to be ... questioning." And that is part of that complexity of what these ideas are about. It is, probably that is the other thing that is critical thinking, but it is also acknowledgement of that complexity. I sort of think I say to students "you know, the one thing I don't want to see is a superficial, just black-and-white answer" because there isn't, you know, the debate is much more complex than that.

As these examples illustrate, academics were reflective about their teaching. They sought to enhance their teaching by reviewing it regularly and improving understanding of how students experienced the course and what learning outcomes were achieved. They seemed open to trying new approaches.

At this stage of the project, I reflected on the learning and teaching approaches that I had observed used in the program. In terms of design-based disciplines, I had previously worked with engineering academics; however, TD was entirely unfamiliar to me. Textile design – as I observed it within the beginning stages of the project – seemed highly creative and artistic and was taught primarily using applied and studio-based approaches. I recall feeling awed by the beauty of the work students produced and inexperienced in understanding the process of creative learning and the pedagogical principles used by academics. There appeared to be a tacit knowing about these phenomena that students and academics understood, which was not obvious to me through the course documentation or my observations. I knew I needed to learn more about this discipline's pedagogy.

At this stage I was comfortable in not understanding this process as I trusted the academics' knowledge and experience. I did, however, question whether "tacit knowing" among the students was in fact there. I wondered if student learning might be enhanced with the use of constructive alignment in course documentation. I was confident that the learning and teaching strategies would reveal themselves as we progressed through the project. I articulated the importance of using appropriate learning and teaching strategies to

support sustainability learning, but chose to focus on exploring this part of the curriculum within the context of the project itself, that is, as we designed the new curriculum. To critique the learning and teaching at this stage did not seem to me to be something I could readily do and would more than likely alienate academics. Therefore, it was enough for me to gain an impression of the learning and teaching strategies being used by accepting academic's perspectives on their teaching, rather than attempting to triangulate the data using my professional learning and teaching perspective at that early stage.

4.6 The Textile Design Program

Academics described the TD Program as follows. It is undertaken over a 3-year period of full-time study. The learning focus of the program shifts over the three year levels. The program has been designed so that students are introduced to fundamental concepts of TD in the first year, with a greater emphasis on teacher-directed learning approaches. These concepts are built upon in the second year and students are required to extend their understanding through more self-directed learning. The third year of the program requires students to use and master the concepts they have covered in the first 2 years and to apply these independently to authentic TD contexts, consistent with how they would be expected to work as graduates. Table 4.2 lists the 2008 program structure and includes reference to specific sustainability learning within the program.

Table 4.2: Bachelor of Arts (Textile Design) 2008 Program Structure Including Sustainability Learning

Courses within the Bachelor of Arts (Textile Design)	Formal sustainability learning in 2008	Courses within the Bachelor of Arts (Textile Design)	Formal sustainability learning in 2008
First Year – Semester 1		First Year – Semester 2	
Textile Studio 1A – GRAP2330	–	Textile Studio 1B – GRAP2331	Included in student project – ‘Craftlife’
Textile Design 1A – GRAP2332	–	Textile Design 1B – GRAP2333	–
Computer Aided Textile Design 1A – GRAP2334	–	Computer Aided Textile Design 1B – GRAP2335	–
Textile Industry and Technology A – GRAP2336	Part B course guide – “The course will focus on a range of topics: [among others] global manufacturing and sustainability issues”.	Textile Industry and Technology 1B – GRAP2337	Part B of course guide – “The course will provide students with skills and capabilities in the areas of: [among others], Sustainability – developing an understanding of sustainable and environmental consideration to all aspects of the textile industry and begin to develop a working practice of sustainable design.”
Second Year – Semester 1		Second Year – Semester 2	
Textile Studio 2A	–	Textile Studio 2B	Included in student project – ‘Soft Machina’
Textile Design 2A – GRAP2338	–	Textile Design 2B – GRAP 2339	Included in student project
Computer Aided Textile Design 2A	–	Computer Aided Textile Design 2B	–
Textile Arts and Culture	–		
Third Year – Semester 1		Third Year – Semester 2	
Textile Studio 3A	–	Textile Studio 3B	–
Textile Design 3A	Option for students to explore sustainability within the scope of a student project	Textile Design 3B	–
Computer Aided Textile Design 3	–	Textile Business and Careers B – GRAP2350	–
Textile Business and Careers A	–		

The program was not promoted as having a sustainability focus. General course information did not include any reference to sustainability specifically or in more general terms. The program described itself thus:

The Textile design degrees of three years full-time program The focus of the program is on training designers for the textile, clothing and footwear (TCF) industries and to provide skills to the development of small and medium-sized enterprises (SMEs). The program focuses on four key skill sets; technology, communication, design and business. 21C career options include in-house studio and freelance design; trend forecasting; product development and design management. Specialist areas include textiles, fashion; sports and performance fabrics; interior furnishing and homewares; carpet design; automotive colour and trim; trend starving; textile research and innovation. (School of Fashion and Textiles, 2008, pp. 1–2)

Students' experience of the program is embedded within the TD discipline. Apart from electives, all courses are taught by TD academics or casual teachers.

There are three core subject areas taught each semester of each year level (excepting Computer-Aided Textile Design, which is not taught in the final semester). These are described briefly below:

- **Textile Design** courses focus on the development of skills and capabilities to design textiles. The textiles produced are knitted, woven and/or surface printed.
- **Textile Studio** courses bring together the textile design and production techniques developed in other courses to achieve creative, effective and innovative design outcomes authentic to the TD industry. Projects in these courses require that students respond to a brief by investigating, researching and experimenting with relevant design approaches, techniques and materials to design and develop a product that matches the design brief.
- **Computer-Aided Textile Design** courses require students to develop the TD skills and techniques associated with computer-aided design as a standard industry tool. The projects briefs are authentic TD tasks.

Before the project commenced, sustainability learning was present in the curriculum in various ways, albeit to a small extent. First, sustainability learning could be explicitly listed in the formal curriculum documentation and hence was a required part of the curriculum. Second, sustainability learning could be included in the student projects at the discretion of the academic teaching the course, which were designed on a year-by-year basis, were

changeable and may or may not include sustainability in any given year. Third was when students were given an option within the scope of a given course to pursue self-directed sustainability learning. Fourth, sustainability learning could be included as an incidental or informal link to the required themes being covered in the course and professional learning. For instance, consideration of sustainability implications in fibre selection may be raised by the academic and/or students; however, this was not specified in the learning outcomes for the course. And fifth, general sustainability principles could be found in some aspects of how the program was managed. In these cases, sustainability was taught very indirectly by reinforcing sustainability practice. For instance, potential industry partners seeking to collaborate with the program through student projects were vetted for appropriate sustainability credentials.

Extract from interview with PC:

All levels of the program have core courses (textile design and textile studio) which include sustainability considerations. Current 3rd years are probably not as sustainability aware, but there has been a focus on sustainability in the last two years, resulting in a greater awareness of sustainability for the current 1st and 2nd year students.

The first year the Industry and Technology course looks at the concepts of sustainability associated with manufacturing, including the purpose of sustainability.

Post-consumer recycling, concepts of cradle to the grave, environmental decision making, just-in-time approaches to manufacturing and supply.

For the last 10 years, the program has been advocating “greener” products and identifying and inviting companies with sustainability credentials to be involved with the program.

Hence, there were aspects of the formal and written sustainability curriculum as well as an informal sustainability curriculum. Examples of the first, second and third types of sustainability teaching are easily identified through the course documentation and are on the public record and reflected in Table 4.2. Table 4.2 is a summary of the sustainability learning already present in the TD Program course documentation, in 2008, prior to the project. The fourth and fifth forms of sustainability teaching are not present in course documentation, and have been identified from interviews with academics. Each type is now explained further.

The first type of sustainability learning found in the program is the formal approval and inclusion of sustainability learning within either the Part A or the Part B of a course guide. RMIT describes these as:

- Course Guide Part A: Course Overview. This provides a general description of the capabilities to be developed in the course and the learning outcomes expected. This part of the Course Guide also describes the general approach taken to learning activities, resources and assessment.
- Course Guide Part B: Course Details. This part provides the specific course information that relates to the semester, location and mode of delivery in which the course is offered. Hence, there will be several Part B Course Guides, one for each offering. (RMIT University, 2012a)

Two courses include reference to sustainability in course guides as specific sustainability-related learning outcomes. Both of these courses are in the first year and together they essentially make the full year course, Textile Industry and Technology A & B (GRAP2336 and GRAP2337). The sustainability focus of these courses has been the environmental considerations of textile production and manufacture. Specifically, these courses aim to:

...provide students with an understanding of the principles of production, manufacturing and the technical language associated with textile fibres and yarns, and how these processes may affect product development, properties and performance of a fabric. The course will also examine broader aspects of the textile industry and specifically the role of the textile designer. (TIT1A Course outline, 2008)

The specific sustainability aspects of the course were described by the TIT course coordinator during the initial interview as:

[Providing students with] a framework for them to think about sustainability. And that was essentially a life-cycle analysis ... most of the environmental impact of the product is locked in at the design stage, so as a designer you are in quite a powerful position to be able to influence, you know, what is important and raise those debates as to “Okay, are you choosing fibres on the basis of providing a good, long life? In its use? Producing it? You know, the energy use within its life? But what happens in retirement? Or do you want to ensure that it can be recycled and there is a life after, you know effectively its first life is finished with”. So it was about instilling a sort of a framework to think about those ideas that they could take it to their design course and, you know, in the back of their mind it wasn’t an add-on, it was part of the design process.

The second type of sustainability learning found in the program is where sustainability learning is relevant to and required within a given course’s student projects. In the case of the TD Program, the part B of the course guides are generic. Students were provided with additional documentation referring to each of the student projects they would be undertaking

during a given offering of a course, called the project brief. The program coordinator advised it was generally agreed among academics for sustainability to be included in a project each year (Personal communication, e-mail June 4, 2008), although the course including a sustainability-related project might vary from year to year.

While sustainability learning was not included in the formal learning outcomes framework as presented in the course guide, it was formally required within student projects. Table 4.2 shows academics included sustainability learning as an appropriate theme to be covered within a number of the projects they developed for their courses. In 2008 this applied to three courses in the program: Textile Studio 1B GRAP2331 in the first year, and Textile Studio 2B GRAP2341 and Textile Design 2B GRAP 2339 in the second year of the program. Also depicted in Table 4.2, the sustainability focus of the existing program is strongly oriented to the environmental aspects of sustainability, as found in other studies. For example, Watson, Lozano, Noyes, and Rodgers (2013) found a similar environmental emphasis in an undergraduate engineering program in the United States.

The open-ended nature of some learning outcomes in the course guide created flexibility to interpret sustainability learning as an adjunct and appropriate to the learning outcome. In the case of Textile Studio 1B GRAP2331, sustainability might be seen as relevant to the learning outcomes of: *knowledge of available materials, equipment and processes to complete project tasks; an ability to select and use suitable materials, equipment and processes to achieve a series of fabric swatch outcomes*. Hence, for academics, sustainability is being seen as a legitimate part of the textile designer's practice. In terms of the formal curriculum, however, sustainability was not at this time characterised as a core aspect of the degree. Rather, its inclusion in a course depended on how the student projects were designed, and could vary from year to year.

In second year, the Textile Studio and Textile Design industry-based project called 'Soft Macchina' included sustainability as a key research theme where "there is an expectation that students will research sustainable approaches for surface design within their theme" (Textile Studio 2B, project brief 3: Soft Macchina, July 21, 2008).

Sustainability learning of this type could be included on a student project when prompted by an external competition that required students to include sustainability. The student project would be aligned with the criteria of the competition:

AA: [the previous year] we did a project with the Design Institute of Australia and it's actually a competition that they hold every year to encourage students to do a project that's based around sustainability.... [W]e actually designed ... a specific project around it in [the course] Textile Design for the students. So they really had to take on board, exactly, all of those issues.

The third type of sustainability learning found in the program may be optional within student-directed projects. In at least one case, sustainability learning was supported and encouraged within courses but not prescribed as to how students might include it in their project. I have referred to this as the optional curriculum, as in these cases the open-ended nature of projects gave students a degree of choice to explore themes within their designs that they were interested in or felt were relevant to their individual projects. In this case, students could choose sustainability-related themes. In the third year design course, Textile Design 3A GRAP2344, the project brief states: "In developing the piece students need to consider the relationship of 'Surface, Structure and Form', as well as the developments occurring with material innovations and textile technologies, sustainability, and design". While students were asked to consider developments in sustainability, considerable scope existed for the student to determine how sustainability might be relevant to their final design, as indicated by the following academic's statement:

... for those students who are interested, because it is effectively a self-directed project, they can decide within the project brief that we set them, they can decide the type of outcomes, where they want to head and what sort of approach they want. For those who are interested I sort of give them free blackboard access to information which is really, probably some of the information they got ... in first year but also additional information that [has been] built on since then. So, I am saying "this is a way of approaching it, this is what you can do". The extent of sustainability included in the project was therefore optional.

The fourth type of sustainability learning found in the program is that already embedded within TD practice, yet incidentally taught as the unwritten or the informal sustainability curriculum. This informal sustainability learning was not specified in student projects or course outlines, but which academics included in their courses incidentally and within conversations with students as themes arose. They saw this as a necessary professional knowledge or skill and as inherent elements of the themes being covered and which arose through students' practice.

Academics referred to a number of themes they saw as part of sustainability learning and which were emphasised to students as necessary to be aware of in their graduate practice; however, these were not specified in the formal curriculum. The themes referred to included:

- Product longevity – where the design of the product seeks to give the product an extended life with use, reducing the need to replace the product and subsequently reducing a drain on resources:

AE: I am always teaching students about ... quality is quite a big issue because once things are well made and well produced and well designed, they will last longer and they will survive and you know there isn't a need of updating as often.

- Fibre production considerations:

AE: Also fibre production is something that I am looking into a little bit to introducing to my second-year class because that is something that they need to start becoming more aware of, like new fibres that are coming through and are they really sustainable or are they, and you know, there is that confusion with fibres about ecological or natural, people instantly think that that is sustainable. It's sort of getting them to become more aware of the differences between what is actually sustainable and what is, you know, natural or ... those differences are quite key ... we do actually source and provide some new fibres for students to work with so they can understand what their properties are. I sort of see it as something that they take into industry with them and the knowledge of, you know, broadening what they can work with or what they can use.

- Availability and sourcing of sustainable materials:

AE: ... and understanding that a lot of companies will have key suppliers that they have always dealt with, but if they don't have sustainable options within that supply then there are other suppliers that can offer that and be able to bring that in and understand, well that company is known for sustainable fibres or have that option, then they can take that with them into industry. You know, they don't have time with industry to be researching all this stuff. A lot of the companies will just stick with what they know or who they have dealt with or have a good rapport with, so if they are not being given those options then they are not going to look for them.

- Conversations and interactions with students regarding sustainability themes to gauge the students' knowledge of sustainability, even if this identifies gaps in students' understanding:

AC: I've experienced a lot of the third year students I have had a bit of a touch on sustainability but it's quite obvious that they haven't really grasped the core concept, the life cycle idea, the cradle to grave philosophies, because they talk a lot about ... "I'm an environmentalist" and then they will hand me a portfolio that's a glossy white paper page printed on an inkjet printer and I think well "if you are about sustainability have you researched even simple things like how you've put the book together? Can it be recycled in itself? What papers and materials have you used?" They are not making that connection. They think if they've filled their recycle bin and they love whales, they are an environmentalist.

- Encouraging students to apply their sustainability knowledge to courses:

AD: For me it is just something that I am trying to integrate, or trying to learn a little bit more about. And even just getting the students to teach me! One of the things that I've been trying to do is to get them to apply some of their knowledge from [the course] Textile Industry and Technology, both in my first-year course and in my second-year course, so they are actually teaching me some stuff ... So it wasn't about researching anything new, it was thinking about what they knew already and applying some of the theories to a fabric that they were designing for upholstery. So it was really about getting them to use knowledge for something else.

The fifth type of sustainability learning found in the program is how learning and teaching practice promotes sustainability learning inherent in day-to-day activities where academics have consciously shifted their practice to make it more sustainable. An example is referred to by AG:

AG: For the last 10 years the program has been advocating "greener" products and identifying and inviting companies with sustainability credentials to be involved with the program.

Moreover, in relation to day-to-day practice, academics also discussed what can be referred to as "counter" sustainability learning, such as few recycling options on campus, or wasteful climate control design. This has been referred to earlier and is the reinforcing of unsustainable practices to students when they are exposed to these as the status quo by academics and the university more widely. Academics felt these could have a negative effect on or devalue sustainability learning. It was felt by academics that there were examples of counter sustainability learning in evidence on campus.

Reviewing the courses on the above five sustainability teaching strategies suggests all academics to some extent, albeit to a very small extent in some cases, were including some aspect of sustainability learning in their courses. The review of the existing curriculum shows that academics are bringing sustainability-related content into the program. Apart from the course Textiles Industry and Technology (TIT), the form of sustainability learning included in courses is entirely discretionary and decided by academics. However, this has not been formally included in the curriculum framing document.

4.7 Proposed Changes

The first conversations and individual interviews with academics suggested potential to work constructively with the group, as a group. They seemed proactive and engaged. This opinion of the group did not change after interviewing everyone. The interviews provided an opportunity to discuss the project at length, allowing us to share ideas and become clearer about the project aims and how we might go about it, mitigating, to an extent, the earlier mentioned reticence.

It was also clear to me that the academics had already deeply considered sustainability in relation to their personal lives and their teaching. They had incorporated sustainability learning into the program explicitly within two courses and in subtle ways in other courses and in the teaching of the program generally. While there was variation between academics in their understandings of and experience with sustainability, they were not sustainability novices. Whether their current understanding of sustainability would support the transformative learning goals associated with sustainability curriculum change was not clear. But, given the design of the embedded project, this was not a concern as the approach was for the group to explore this issue together.

The extent and form of the sustainability learning envisaged necessary for students varied among academics. For some academics, sustainability was seen as a core concept or principle that defined the practice of TD.

Moving into the proposed form for the curriculum change project, at different times different models and options were put forward by different stakeholders. One view was for an integrated whole-of-program approach, most consistent with the embedded model:

AA: My aim was to sort of provide I guess a framework for them to think about sustainability. And that was essentially a life-cycle analysis of the key points within the project and how ultimately the idea being that as a designer most of the environmental

impact of the product is locked in at the design stage, so as a designer you are in quite a powerful position to be able to influence, you know, what is important and raise those debates ...it wasn't an add-on, it was part of the design process.... So that it is a little bit more holistic.

AB: As a textile designer you are trying to develop a whole range of skills. We're realising or actually maybe this [sustainability] is one of those skills that you need as much as you might do a board, or you might do some research, market research or trend research.

Other academics only referred to students needing to have an awareness of sustainability:

AE: We want them to be prepared for the work life that they may have... I guess that sustainability is becoming an issue, so they need to be aware of it.

Another option proposed by the program coordinator at this stage was to embed sustainability only across the Textile Studio courses at all year levels (correspondence with PC, July 12, 2008), while yet another option suggested at a different time was for a stand-alone sustainability course within the program rather than embedding it across the majority of courses. This variation suggested the possibility of different visions for the sustainability curriculum among academics.

Regardless of the curriculum form, at this stage of the project the HOS viewed this work as long term, involving cultural change. In the first interview he mentioned that he saw the project taking at least 5 years to achieve full cultural change, thus pointing to the need for integrated sustainability into the program. Here, sustainability is a core aspect of what it is to be a textile designer.

4.7.1 Empowerment for change

The group saw themselves as having control over their courses to bring about the required changes. In terms of being able to make changes to their course curricula, academics referred to being able to interpret their course's curriculum as they saw appropriate:

AB: In terms of our courses, we do have quite good ownership. I mean, we are still working within the framework of, you know, core skills and competencies that we are trying to teach, but within that ... I get freedom in terms of, I haven't got someone telling me this is what you have to teach, this is the way you have to teach it, you know, I can work out for myself work, what I think works, what I am interested in and you know on a certain level I get that freedom, which I think is fantastic and that allows you to be, I guess, to be more interested in wanting to take things further.

Facilitator: You can't see problems with introducing some concepts of sustainability into what you're teaching at the moment?

AA: No, none whatsoever ... it's really up to me to say, "Well, how can I change this in a way to make it more relevant?"

AC: We have the freedom here in our program that we are known to be upgrading and changing our curriculum all the time, constantly ... we are pretty innovative that way, we are responding to what we see is a need. So in that sense I would say we are pretty empowered ... and we can run with this.

Further, supporting the impression of the freedom to self-manage teaching, the HOS described his leadership style as recognising the capabilities of his staff and to encourage them to undertake the project without interference from him and by supporting them as much as he can. He wished to stay informed of the progress of the project and to be informed of any problems or issues that arose, but essentially the design and implementation of the project was up to "the group" – the academics and myself:

AC: So in that sense I would say we are a pretty empowered and we can run with this. It is a matter of what it comes down to in practical issues, the kind of support we have. But it sounds like, I mean you know we've got [the program coordinator] supporting it as program coordinator so as a starting point [the Head of School] is behind it so, we've got those sort of safety nets to say "yes this is where we should be heading, we are supported and do it etcetera".

While there was support for engaging in sustainability-related curriculum change, there was uncertainty about how to bring it about:

AC: We've already been having conversations as a group of staff about how can we really integrate sustainability better across the whole program, not just individual courses just touching on it, but how can we build that knowledge?

To bring about sustainability curriculum change though, a number of academics saw themselves as needing to learn about sustainability in order to bring about the necessary curriculum changes, which they were prepared to do.

AC: I think I just need to learn a bit more about the whole life cycle. I went to a Design Victoria seminar earlier in the year that was about eco-design and I've been tapping into them throughout the year. There have been different businesses talking about their own practice, and that sort of thing. So I think that information that I'm gaining I can apply to my teaching

AE: ... particularly from a teaching perspective, it is about for me doing further research into how I am going to approach a lot of the sustainable issues in knitting. It is like “urgh”, you know, it is just quite a broad area that [another academic] and I, because we work quite closely, we sort of feed off each other a bit, so it is sort of working out how to bring it in a little bit more ... you research and you find new things, so I guess that is part of it.

AF: ... and how informed am I at the time as well? So I think there is a lot I have to learn and particularly now with all this discussion that we are having about, you know, really embedding it into the program, in terms of feeling comfortable to be able to, I guess, discuss it with students.

Academics were open to the process of curriculum change and active in reviewing and improving their courses generally. In some cases, academics suggested they were unfamiliar with curriculum change theory and practice, which could impact their confidence to introduce sustainability related changes:

AA: As an untrained teacher in that sense [I am unlikely to make major curriculum changes], you know, not formally trained, you know, there are still things I’m learning and it’s important to take on the information [the current curriculum] that exists to know that it’s a formula that’s been working and you know, not to throw the baby out with the bath water.

Academics refer to low or beginning confidence for including sustainability in their courses. There is a sense that they are experimenting or taking tentative first steps towards including sustainability as an integral part of the program.

4.8 The SWOT Analysis

As discussed in Chapter 2, the project facilitator role includes interpreting and designing for change (Fletcher & Zuber-Skerritt, 2008; Yorke, 2002). The final component of the pre-step phase of the project involved reflecting. Using a SWOT analysis, I reflected back to the group in the first workshop what I had observed from the pre-step as the advantages, limitations, possibilities and challenges. Figures 4.1, Figure 4.2, Figure 4.3 and Figure 4.4 are the actual PowerPoint slides presented to the group in Workshop 1. Working through the slides, I explained each factor or theme and how it had been identified. The SWOT analysis was presented to the group during Workshop 1, with the group agreeing with an academic’s comment that the SWOT was “[q]uite a good basis for us to work on” (AG – Workshop 1 transcript).

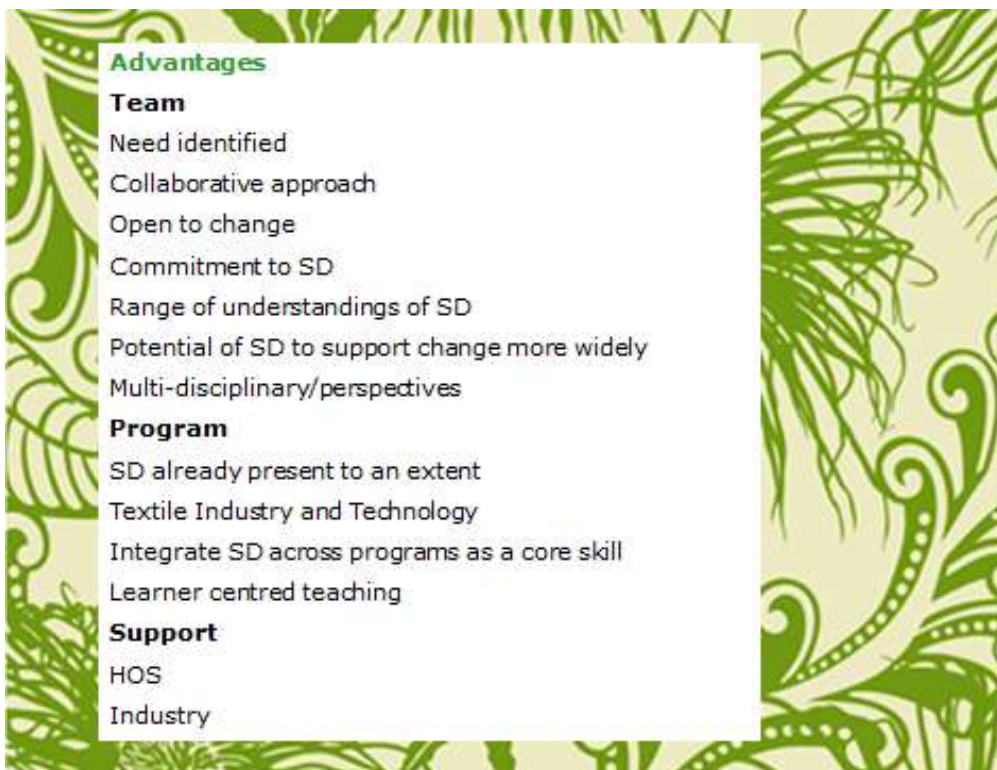


Figure 4.1: Advantages supporting sustainability related curriculum change.

Note: Advantages are seen as the factors or themes which are likely to support the curriculum change project.



Figure 4.2 Limitations restraining sustainability related curriculum change.



Figure 4.3 Challenges to undertaking sustainability related curriculum change.



Figure 4.4 Possibilities for undertaking sustainability related curriculum change.

4.9 Pre-Step Summary

All seven academics agreed to be involved in the project at the start. The HOS and the PC had indicated the academics' willingness and this was confirmed through their preparedness to be interviewed by me in this first stage of the project. Given the recognised positive correlation between sustainability attitudes and behaviour (Arbuthnott, 2009; Michalos, Creech, McDonald, & Kahlke, 2009), the data gathered at this first stage suggests academics are knowledgeable and supportive of actively working towards embedding sustainability in the curriculum.

As stated by the HOS, the academics in the program were not working from a "zero base" in relation to sustainability learning. The academics had started a process of including sustainability in the curriculum, albeit modestly, believing they lacked the necessary expertise. They wanted to build upon their current sustainability status, however, to give greater validity and credibility to this aspect of the curriculum.

At the pre-step stage, therefore, academics valued the possibility of working collaboratively on a dedicated curriculum change project with expert and/or external support. While they could continue working independently to realise sustainability more effectively in the curriculum without the project, there was recognition that the narrow work to date, while worthwhile, was ad-hoc and disparate within the program and could be significantly enhanced by a coordinated initiative to bring together what had been achieved so far, and build upon it in depth and for coherence across the program.

Chapter 5: Findings – Three Cycles of Action Research Progressing the Curriculum Change and Project Evaluation

5.1 Introduction

This chapter describes the conduct of the action research project to bring about sustainability-related curriculum change in the TD Program at RMIT. It presents three action research cycles of curriculum change undertaken by the academics teaching into the program (the group) and myself (the facilitator). An evaluation of the outcomes of the curriculum change project is then presented that demonstrates that the project has been successful in bringing about sustainability learning in a range of forms for different stakeholders.

Based on a project plan developed by the group, this chapter tells the story of putting that plan into action. The chapter describes three cycles of constructing understandings, planning action, taking action, and evaluating action. The main thread through the work is the design of the curriculum aspects of the project. During the first cycle, the group aimed to develop sustainability-related learning outcomes appropriate for their courses and the program overall. The second cycle focussed on teaching the new learning outcomes. The third cycle focussed on enhancing the assessment of the learning outcomes. Each cycle had many associated and complementary activities. These are also described briefly within the relevant cycle outline.

As discussed in Chapter 3, the project resulted in a very large amount of collected data. Selected data is presented in this chapter for a number of specific purposes: to describe the action research cycles, to demonstrate the project outcomes in relation to the evaluation framework, and as supporting evidence for the discussion presented in Chapter 6.

5.1.1 The cycles overall

Figure 5.1 is a representation of the overall process showing the main steps of the curriculum change project. The depicted flow of the process represents the emergent, open-ended and multifaceted nature of the project; it was never entirely obvious what would come next. While the curriculum change process itself can be described as reasonably linear (see, e.g., Desha & Hargroves, 2014), there are many other factors influencing the process that are highlighted in this chapter (Hubball, Gold, Mighty, & Britnell, 2007). While the goals of the project were agreed the process of getting there was not predetermined.

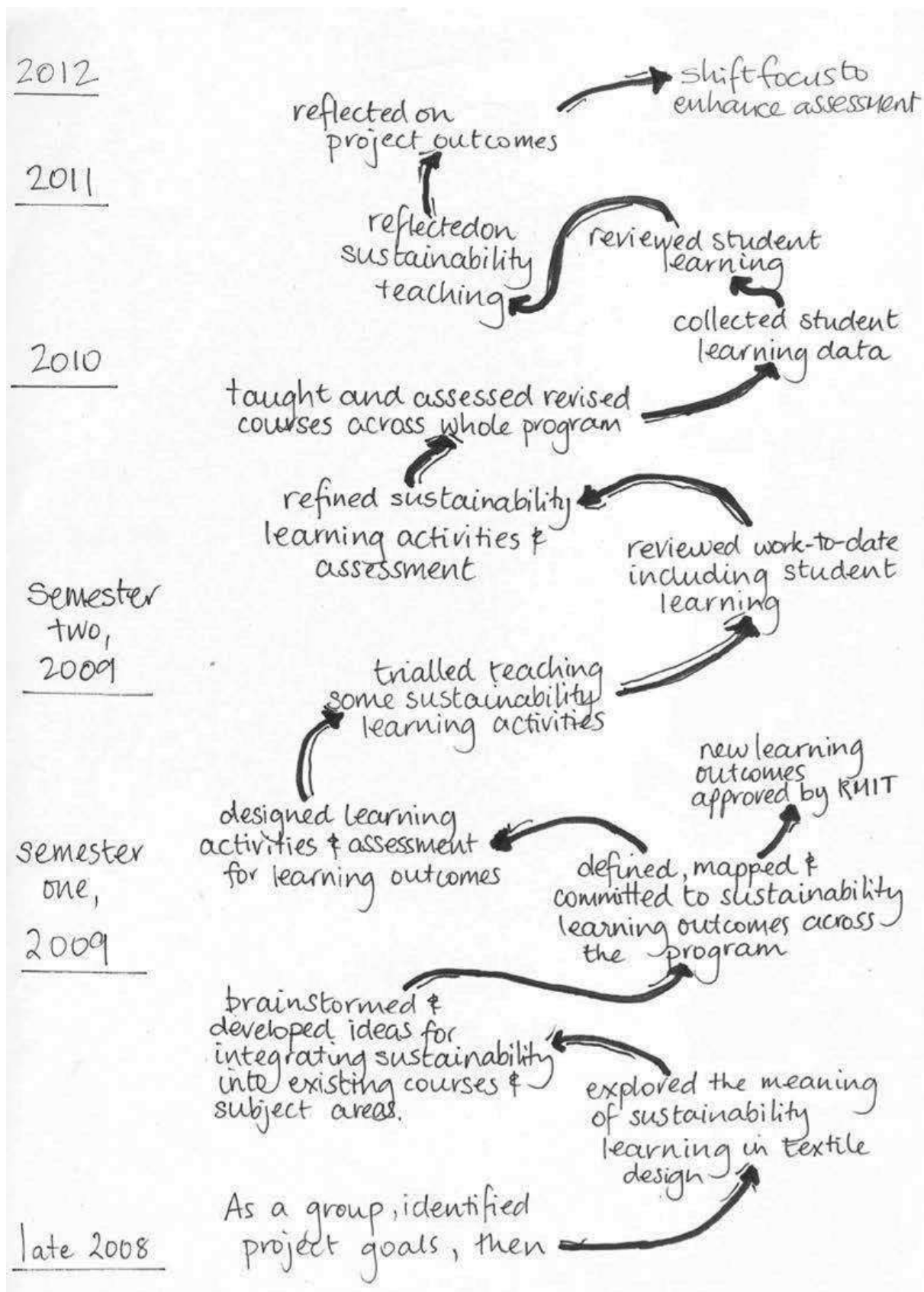


Figure 5.1: Representation of the key activities of the curriculum change project.

While curriculum change is often organised as a set of linear steps, this can have the effect of suggesting that each of the steps are discrete, well defined and able to be completed before

the next step is undertaken. For our group at least, this was often not the case. There is a sense of the messiness, nonlinearity or fluidity of the process we used throughout the curriculum change process. For instance, early in the process we explored the meaning of sustainability learning within the TD discipline. This was an important discussion necessary to inform the next step of starting to develop ideas of sustainability-related learning relevant to the program. The meaning of sustainability and sustainability learning for group members, however, was in a continual state of change throughout the project. In fact, these changing understandings attest to the more sophisticated and robust understandings developed by group members later in the project and are reflected in the final curriculum. Evidence of this is elaborated in Chapter 6. Hence, embracing and allowing fluidity was a necessary part of the process and is a theme throughout the chapter.

5.2 Cycle 1 – Developing Sustainability-Related Intended Learning Outcomes

Cycle 1 moved the project from an initial agreement regarding the need to embed sustainability into the curriculum to a point where a set of agreed and approved intended learning outcomes (ILOs) were ready to be incorporated into specific courses. Cycle 1, therefore, aimed to develop a map of the sustainability learning for the whole program. The four stages of Cycle 1 are discussed in this section, as per Figure 5.2.

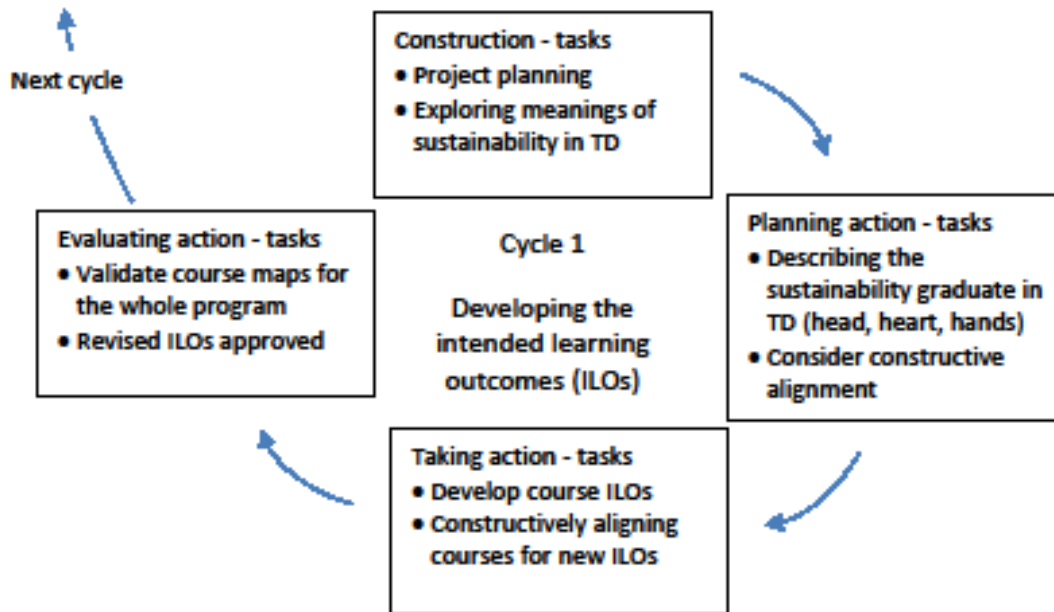


Figure 5.2: Stages of Cycle 1.

5.2.1 Constructing: Thinking about sustainability in the textile design curriculum

Constructing is where group members discursively developed preliminary ideas about what the project would aim to do (Coghlan & Brannick, 2010). In Cycle 1, constructing involved setting up and agreeing on a preliminary plan for the project. This included exploring meanings of sustainability in relation to TD to better understand the issue.

The goals of the project were agreed in Workshop 1 as the first task of the project. This involved reviewing the SWOT analysis that had been prepared, based on the pre-step, outlined in Chapter 4. Following group validation of the SWOT analysis, some possible goals for the project were introduced by the facilitator. These were discussed and revised. While the project aimed to bring about sustainability curriculum change, the group saw that a number of concurrent, supporting goals were also required. The final agreed version of the six project goals, although they were considered a work in progress, is presented in Figure 5.3.

The project has multiple strands

1. Staff development
2. Resource development
3. Curriculum change
4. Student engagement /modelling/feedback
5. Engaging other stakeholders
6. Driving local action



Ideas for achieving these

Staff development

- T&L approach questionnaire
- Sustainability in textile design
- Involve sessional staff

Resource development

- Framework for assessing resources
- Database – electronic wiki
- Make database available to others
- Explore Francis Burke option
- Archive student work
- A physical space to dedicate to resources
- Budget to purchase resources – explore possible support from NGOs/govt etc

Curriculum change

- Identify sustainability goals &ILOs
- Map sustainability across course
- Revise courses
- Approval of changes
- Implement changes
- Evaluate changes
- Develop a glossary of terms for staff and students to support a common vocabulary regarding sustainability
- Look at common approaches to greening the curriculum
- Course admin
- Gradebook
- Share student work amongst students and staff

Student engagement /modelling/feedback

- Ask students what they want and feel comfortable with regarding sustainability
- Make sustainability explicit
- Promote and model sustainability

Engaging other stakeholders

- Gather industry data
- Feedback to industry
- Market sustainability amongst stakeholders
- Develop principles for industry engagement

Driving local change

- Create an environment which models sustainability for students
- Course admin
- Design concept for Textile Design sustainability

Figure 5.3: Project goals agreed by group in Workshop 1.

The project goals take a holistic view of the broad context of sustainability-related curriculum change. The goals account for and emphasise the curriculum change as occurring within a bigger system of RMIT, the school, the program, industry and the discipline. The goals seek stakeholder involvement and emphasise learning and change for participants and other aspects of the system.

The group also brainstormed preliminary ideas for achieving the goals. This chapter reports on the ideas and approaches actually put into practice to realise the goals. Some of these preliminary ideas were very useful in practice, others were not. Some ideas were never mentioned again, and further new ideas came to the group as the project unfolded. Consistent with an emergent project approach, ideas viewed as potentially worthwhile were trialled, evaluated for their usefulness, and allocated a place in the project outcomes accordingly. This experience accords with the unpredictability of the curriculum change process (Hubball & Burt, 2004).

Over a 2-year period, the group collaboratively defined, located and critiqued sustainability within the TD discipline, the profession, the existing degree and student learning needs. The first activity to explore meanings of sustainability in TD occurred during Workshop 1. The group were invited to review and discuss existing definitions of sustainability. In a group activity they then brainstormed what sustainability meant within the discipline of TD. After first identifying their own understandings, they related and arranged these in relation to the understandings of others in the group to come up with a shared representation, shown in Figure 5.4. The significance of collaboratively developing shared meaning within the group is discussed further in Chapter 6. This activity was essential for the work that followed. This was a loose definition, considered a work in progress, yet necessary to inform the next stage in the cycle and beyond.

Thinking about sustainability in relation to textile design – towards an initial definition – regrouped
11 December 2008

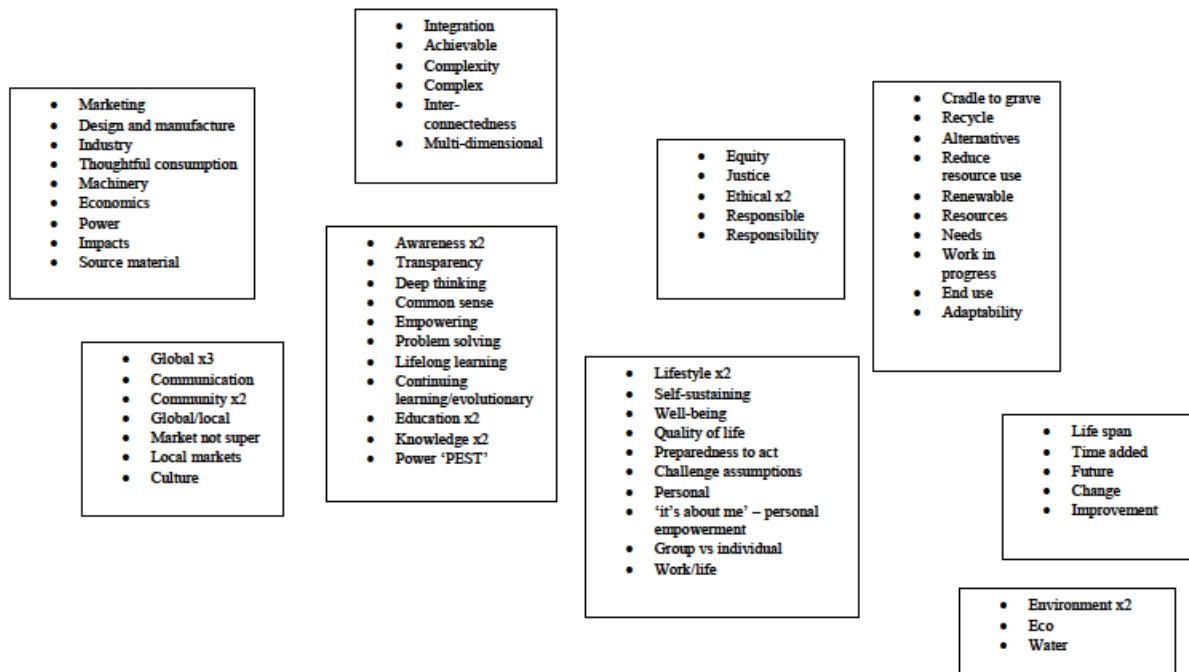


Figure 5.4: Group's sustainability ideas reorganised.

5.2.2 Planning action: What do we need to do to develop the ILOs

In Cycle 1, the planning action stage first focussed on clarifying a vision of the sustainability learning a TD graduate needed to practise more sustainability in the TD profession. The next step involved adopting a learning and teaching framework to unpack this sustainability attribute in order for it to be embedded across the curriculum.

The aim was to identify a list of sustainability-related qualities or subattributes to frame the sustainability learning within the TD curriculum. This was referred to as the sustainability Head, Heart and Hands (knowledge, attitudes and skills) of the TD graduate; the sustainability learning a graduate required in order to practise sustainably in the discipline and/or profession. During Workshop 1, the group collaboratively developed a holistic set of qualities or subattributes using Bloom's Head, Heart and Hands learning domains as a guide (Sipos et al., 2008). The group's sustainability ideas brainstormed earlier assisted in clarifying this vision for what students could work towards over the course of the program, see Figure 5.5. Similar to the understandings of sustainability activity discussed above, this activity was essential for informing the work that followed. It was a tentative starting point, considered a work in progress; to be used and amended as needs be in the next stages of the cycle and beyond.



	to <u>Know</u> principles and facts of	to <u>Value</u>	to have <u>Skills</u> to
Facts	Sustainable Design		be Technically Competent
Creative	Creativity, Innovation, Design in context & Transferability	Creative Passions, Open Sources & Ideas Sharing	be Creative be Adaptable & Transfer Ideas
Comms	Communication	Having a Design Community, Networking, Collaboration & Empathy	Network
Academic	Critical thinking, Research, Problem solving & Resourcefulness	Ethical Approaches	Research, be Resourceful &
Proactive futures	Leadership by Example, Lifelong Learning & Future Thinking	Action, being a Change Agent & Vision	Lead

Figure 5.5: Textile Design graduate sustainability-related sub-attributes (Head, Heart and Hands).

As the pre-step established, the group were unfamiliar with existing theoretical frameworks of curriculum design. Introducing the group to constructive alignment (Biggs & Tang, 2007a) assisted in moving from the ideas of what sustainability learning would be required of the TD graduate to actual learning outcomes. During Workshop 2, the group were introduced to the purpose of constructive alignment as integrating the three curriculum elements of learning outcomes, learning activities and assessment, and the significance of doing so. The group used this framework to start to identify existing sustainability learning in current courses. Individuals were encouraged to identify and map the sustainability learning in their courses using constructive alignment. Templates were provided to assist with this.

5.2.3 Taking action: Developing the ILOs

In Cycle 1, taking action involved two main tasks consistent with standard curriculum change procedures. The aim was for group members to map their existing courses against the sustainability TD graduate developed in Workshop 1. This would enable group members to consider the ways their courses could be changed to develop the sustainability TD graduate more fully, leading to the development of new ILOs for the courses. In practice, however, the “taking action” stage did not proceed in this order. During Workshop 3, group members had started mapping the sustainability learning in the existing courses and discussing possibilities for new sustainability learning to be added into their courses. They did not, as agreed during Workshop 3, make much progress on these in preparation for the anticipated next workshop.

Instead, the group moved to developing the new sustainability-related ILOs for the courses without fully mapping the existing sustainability learning in their courses. Completing the mapping had become very slow while the deadline for submitting new ILOs for approval to be implemented the following year loomed. The action focus shifted, therefore, to developing the new ILOs. The facilitator and a group member intervened to create and implement an alternative process to developing the new ILOs. The significance and detail of this alternative process is discussed further in Chapter 6 in relation to the importance of just-in-time facilitation to supporting curriculum change.

The new ILOs developed and submitted for approval are listed in Table 5.1. Each ILO is inherently linked to the nature of the course and the overall learning goals of the course; that is, the sustainability learning covered in a course will be relevant and pertinent to the course. It is noted that not all courses in the program included a sustainability related ILO. The decision to introduce a sustainability-related ILO to a course was determined by the course coordinator after considering the relevance of sustainability learning to the course overall.

Table 5.1: Sustainability Intended Learning Outcomes Developed for the Course

Course Title	Sustainability related intended learning outcome developed for the course
GRAP2332 Textile Design 1A	Apply the principles and practice of sustainability relevant to the production of textile materials.
GRAP2336 Textile industry and technology 1A	Develop a working knowledge of sustainable design by applying the principles of sustainability to the manufacture of textiles locally and internationally by understanding environmental factors.
GRAP2334 Computer aided textile design 1A	Apply the principles and practice of sustainability relevant to the production of digital works.
GRAP2333 Textile Design 1B	Apply the principles and practice of sustainability relevant to the production of textile materials.
GRAP2337 Textile industry and technology 1B	Develop a working knowledge of sustainable design by applying the principles of sustainability to the manufacture of textiles locally and internationally by understanding environmental factors.
GRAP2335 Computer aided textile design 1B	Apply the principles and practice of sustainability relevant to the production of digital works.
GRAP2331 Textile Studio 1B	Apply the principles of sustainability to the textile design process by using appropriate media resources.
GRAP2338 Textile Design 2A	Apply the principles and practice of sustainability relevant to the production of textile materials.
GRAP2341 Textile Studio 2B	Apply the principles of sustainability relevant to the design of textile products.
GRAP2339 Textile Design 2B	Apply the principles and practice of sustainability relevant to the production of textile materials.
GRAP2343 Computer aided textile design 2B	Apply the principles of sustainability relevant to the production of digital works.
GRAP2344 Textile Design 3A	Apply the sustainability principles relevant to the design and making of textile fabrics.
GRAP2348 Computer aided textile design 3	Apply the principles and practice of sustainability relevant to the production of digital works.
GRAP2346 Textile Studio 3A	Apply the principles of sustainability practice relevant to the design and making of textile fabrics.
GRAP2345 Textile Design 3B	Apply the sustainability principles relevant to the design and making of textile fabrics.
GRAP2350 Textile Business and Careers 3B	Research, apply and explain the principals of sustainability relevant to textile business models.

Next, individual group members prepared a map of the sustainability learning that would be present in their course. Constructive alignment was used as a consistent framework for this mapping process, which addressed the ILO for the course by identifying appropriate learning activities and assessment. An example is the map for second-year Textile Studio B (TS2B) prepared by an academic as a work in progress for group discussion, and with refinement, possible implementation in 2010 in Figure 5.6. Figure 5.6 locates the TS2B sustainability ILOs within the other Textile Studio courses in the program, stating TS2B aims to “research and apply sustainability principles relevant to textile studio”. How this learning would be implemented is presented in Figures 5.7 and 5.8. The sustainability learning planned for the course is linked to each of the two student projects. The type of learning, for example, to

apply or to research aspects of sustainability, is accounted for in the learning activities and the assessment, consistent with constructive alignment.

Sustainability project mapping for Textile Studio 3/7/09

So far we have covered the; **apply**, **research** and **none** criteria. I think this is ok, when looking at the matrix there seems to be an even spread of all criteria across the program.

Course	Criterion
Textile studio 1A	No sustainability learning outcome needed for this course
Textile studio 1B	To apply sustainability principles to the design process
Textile studio 2A	No sustainability learning outcome needed for this course
Textile studio 2B	To research and apply sustainability principles relevant to textile studio
Textile studio 3A	To research and apply sustainability principles relevant to textile studio
Textile studio 3B	???

Figure 5.6: Sustainability intended learning outcomes for Textile Studio courses.

Textile Studio 2B – [car company] ‘Transition’ project (decision making, rationale, awareness. What influences our decision making process?)

Sustainability ILO's	Learning Activity	Assessment	Assessment criteria
For students to reflect on where sustainability fits into their design process (multidisciplinary project with industrial design) (Evaluation)	Collaborative group formation. Individuals to reflect upon own design process, compare with peers, compare with ID students, consider lecturers viewpoint and reconsider their own approach.	Reflective blog How did today's collaborative activity change your view of the design process?	<i>Provides a reflective summary and analysis of individual and group learning experiences. It provides a reflective record of project experiences and quest for greater understanding</i>
For students to give examples (research) and discuss (apply) the role of new materials / technology in given context whilst considering issues of sustainability <i>([Academic name] this will cover Textile design)</i> (Comprehension)	For students to actively research new materials and technology related to their theme and project work.	Research folder – collected research / reference with reflective analysis of relevance to project work. Questions posed to industry experts, their answers and subsequent opinion.	<i>Includes collection of relevant visual and written resource material (references), research, personal analysis and annotated notes appropriate to theme. ([Academic name] I pinched this from last years' design assessment sheet)</i>

Figure 5.7: Sustainability learning map for Textile Studio 2B – car company project.

Textile Studio 2B – [textile company] project

Sustainability ILO's	Learning Activity	Assessment	Assessment criteria
Research For students to define (to state the precise meaning of) the fair trade movement. Why does it exist? (Knowledge)	Small group to research Fair-trade movement, to present findings to class. Week 9. Present and explain (need to give students 5 examples of fair trade in action)	Presentation to staff, peers and [textile company] representatives at end of project Documentation of research	Clear and well prepared presentation Research folder
For students to appraise (determine the worth of) the Fair trade movement. (Evaluation)	Small group to appraise the fair trade movement, to present findings to class Week 10. Evaluate one of the examples perhaps) Compare with non fair trade (positive and negatives)	Presentation to staff, peers and [textile company] representatives at end of project Documentation of research	Clear and well prepared presentation Research folder
Apply For students to propose (to offer or suggest) the integration of fair trade ideals into the [textile company] brand (Synthesis)	Small group to propose the integration of fair trade product into the [textile company] brand (present to class) Week 11 Students to review overall presentation content and put together a 30-minute presentation for staff and [textile company] representatives. Need to establish roles for students (who presents, who puts together the presentation etc)	Presentation to staff, peers and [textile company] representatives at end of project Documentation of research	Clear and well prepared presentation Research folder

Figure 5.8: Sustainability learning map for Textile Studio 2B – textile company project.

5.2.4 Evaluating action: Evaluating the ILOs

In Cycle 1, evaluating action involved validating internally within the group, and externally within RMIT, that the newly developed ILOs were appropriate.

Validating the program ILO map was achieved by the group coming together and examining the planned sustainability learning and teaching for each course and establishing an appropriate coverage of the Head, Heart, and Hands elements across the program.

During Workshop 4, group members presented the sustainability learning and teaching map of their courses in response to the new sustainability-related ILO. The discussion included an explanation of how the ILO fitted within the course, how the course learning activities reflected the sustainability learning, and how it would be assessed.

Extract from facilitator's email, July 2, 2009, regarding Workshop 4:

The aim of the day [Workshop 4] is to get as far as possible with deciding which sustainability skills, knowledge and attitudes will be taught in which courses. That way, individuals or groups can start thinking about their courses for next year during second semester.

Working collaboratively, we will take the idea of the graduate (wrt sustainability) and identify what students need to learn and when, and which courses lend themselves to that learning. This of course, will ultimately align with the new ILOs – copy sent round yesterday. So rest your voices the day before, as everyone will need to do lots of talking :-)

Mapping the ways each of the course areas currently do re: sustainability will be really helpful to this process. Some of you have also included new ideas in your maps too. This is great because this starts to give us a range of ideas/possibilities to choose from when we are deciding what goes where. If you would like some assistance to do the map, please don't hesitate to email me.

The group discussed all courses signifying sustainability learning in the program. Group members tested their ideas about what was relevant to their courses. In this way, a fuller picture was built up of how sustainability was included in the program overall. During the workshop, clarifications and adjustments were negotiated and made. They made connections between courses and discussed opportunities to collaborate to scaffold and reinforce student learning across the program. They identified different stages of the program as offering different sustainability learning opportunities, as illustrated in the following transcript extract that came late in the workshop and was a reflection on the discussion thus far.

Extract from transcript of Workshop 4:

AB: It is interesting actually ... particularly with what [an academic] has just been saying, because I've just started [making notes] ... first year in a sense is about principles and concepts of sustainability, which is coming from my area. And really what we are about is that link between design skills and the principles and concepts of sustainability. In second year you are building on that, but the nice thing is, in one sense, you are starting to get down to some more details and some of the core things that haven't been covered in first year, and I don't think will be covered. In third year is fair trade, so that side of the thing, packaging, which is another part of our industry. And that consolidation of building on research, so things like with the [second-year car] project challenge ...

thinking, critical thinking skills and research to do with that link of design to sustainability.

Through this discursive process the whole-of-program approach to sustainability learning became more coherent and strengthened. This led to the group internally validating the sustainability-related ILOs and their plans for their courses and the program as a whole for the following year.

The revised ILOs were approved to be introduced the following year by the relevant RMIT committees. This approval forms part of the evaluation in that the ILOs were compliant and consistent with the RMIT standards.

5.2.5 Complementary activities contributing to Cycle 1

Cycle 1 included a number of additional activities occurring outside of the formal workshops. These are represented in Figure 5.9 by the bubbles surrounding the stages of the cycle. These activities arose largely from suggestions by group members, either during workshops or from other informal meetings. These were actioned by members of the group or me. There were also many impromptu discussions and meetings occurring as well. These complementary activities demonstrate the rich backdrop in which the curriculum change took place. These activities are now discussed in brief.

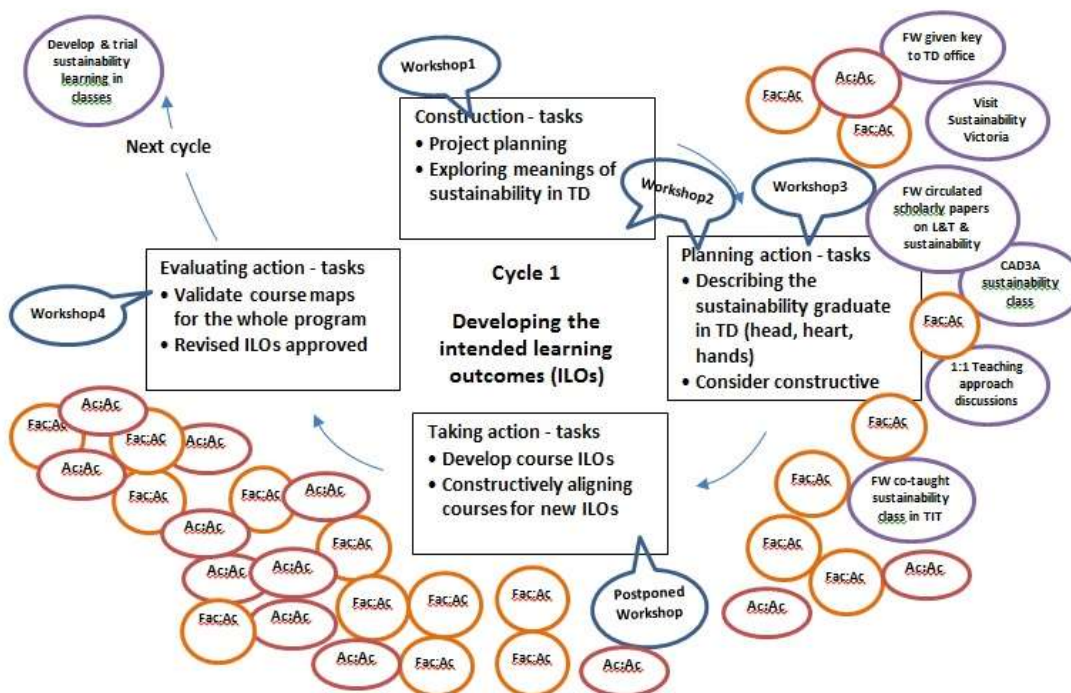


Figure 5.9: Stages of Cycle 1, including complementary activities

Ac:Ac

This symbol represents individual group members discussing and/or working together on aspects of sustainability learning and the project. The number of these symbols in Figure 5.9 is an indication of the relative frequency of these collaborations during the cycle, and not the actual number of these collaborations. This became more of a feature of the project as time went on. Group members identified opportunities to collaborate with each other to progress their own goals for their teaching and research. For instance:

Two academics have each put in a paper for a ... conference which have included aspects of sustainability. (Facilitator Journal 1, p. 181)

Fac:Ac

This symbol represents individual group members discussing and/or working with the facilitator together on aspects of sustainability learning and the project. The number of these symbols in Figure 5.9 is an indication of the relative frequency of these collaborations during the cycle, and not the actual number of these collaborations. Meeting with individual academics was a continual feature of the project, beginning with the 1:1 interview/discussions informing the pre-step stage. These could be incidental, over a coffee, about shared interests in learning and teaching and sustainability. For instance:

Have had a few interesting chats with AC about art/design learning and teaching. AC has just started the Grad Cert Learning and Teaching. (Facilitator Journal 1, p. 174)

They could also be more project focussed. For instance:

Just discussed a few steps with the PC. PC is ok for me to give the HOS a briefing on the project. (Facilitator TD Workbook 1, p. 26, April 2, 2009)

Facilitator
given key to
TD office

As facilitator, I was allocated a workspace within the open-plan shared TD staffroom in early 2009 and also given a key. My diaries and journals show I attended the Brunswick campus or other campuses on at least 56 days in 2009 and 47 days in 2010. I had aimed for 2 days per week on campus; however, in reality this was closer to 1 day a week, with the 2 days per week being made up with days I worked from home. When on campus, I worked the whole day from the office, as a co-worker in a sense. This facilitated many impromptu discussions and ad hoc meetings between myself and an individual academic or a small group of academics about the project. This helped with just-in-time responses and problem solving as well; a quick chat with an academic meant we worked out responsive strategies to issues as they arose. Being co-located meant opportunities for social interaction as well. The 2010 survey of group members showed 7/7

group members reported these discussions to have contributed either moderately or a lot to their ability to embed sustainability into their curriculum.

Visit
Sustainability
Victoria

The visit to Sustainability Victoria (SV) was suggested by one academic to observe and research their recognised sustainability best practice with a view to informing the project and achieving some of the project goals. I followed up on this suggestion by organising the visit, which went ahead in March 2009. The visit included a tour of the sustainably designed premises, a presentation on SV's mission and projects and their organisational culture and practices, as well as how they work with industry. The 2010 survey of group members showed 7/7 group members reported this visit to have contributed either moderately or a lot to their ability to embed sustainability into their curriculum.

Facilitator circulated
scholarly papers on
L&T & sustainability

In response to a request for examples of good practice in sustainability learning and teaching, I circulated some academic papers on the topic to members of the group. The 2010 survey of group members showed 6/7 group members reported these to have contributed either moderately or a lot to their ability to embed sustainability into their curriculum.

CAD3A
sustainability
class

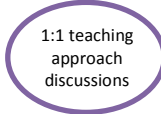
There were two examples when I was invited to teach or co-teach classes. Group members who taught the third-year Computer-Aided Textile Design classes invited me to work with them to introduce some sustainability learning into their classes. We workshoped ideas for the lesson goals and the lesson plan together. I was asked to teach the class because group members suggested "it would be good coming from a fresh/outside voice" (Facilitator Journal 1, p. 175, March 18, 2009). I prepared and taught the lesson. The group members and I agreed the class was not as successful as hoped. Nonetheless, it proved an insightful experience as we reflected that the sustainability learning would have been more effective if it had been contextualised and embedded into the course, rather than a one-off class.

Facilitator co-
taught
sustainability
class in TIT

The other of example co-teaching was a class in first-year Textiles Industry and Technology (TIT). This was an introductory session to sustainability, which was an explicit aspect of that course. The academic and I developed a lesson plan collaboratively that drew on the introductory activity I had

presented in Workshop 1 with the group. We taught the class collaboratively and found students to be responsive and engaged. This co-teaching experience became the basis for a collaborative, peer-reviewed academic paper co-authored by the TIT academic and me.

The 2010 survey of group members showed all four group members involved in team teaching with the facilitator found the experience to have contributed either moderately or a lot to their ability to embed sustainability into their curriculum.

 For the purposes of the study I asked group members if they would be prepared to discuss their teaching approaches with me. This led to one-to-one teaching approach discussions between me, as facilitator, and each academic. I gave them a survey to complete based on Trigwell and Prosser's (2004) Approaches to Teaching Inventory (ATI). Their responses formed the basis of an hour or so long discussion on their teaching approaches. I observed individual group members reflected that learner-centred approaches were prevalent among the group, consistent with my earlier observations of studio-based classes. As the survey was not the exact ATI, the results of the completed surveys were not conclusive. The discussion that was prompted, however, proved to be somewhat worthwhile, with 4/6 group members reporting in the 2010 survey that the discussion contributed either moderately or a lot to their ability to embed sustainability into their curriculum.

Some activities suggested by the group, when attempted, never got off the ground; the sustainability wiki for instance. The idea of having a wiki for the group was seriously suggested by the group in Workshop 1. They observed the group had resources but these were siloed currently and suggested it would be helpful to have a repository for sharing these. In response I set up a Wiki for the group. Yet, it was not something the group took ownership of:

I note that at this time [after 5 months] I am the only contributor to the sustainability Wiki for staff. AA has given me some feedback which is positive – see email, but there is no obvious evidence that anyone else has looked at it. (Facilitator Wiki filenote, February 24, 2010)

Another example of activities not picked up by the group was personal journalling. This was suggested by the facilitator in Workshop 3, with most group members indicating they would try keeping a journal. In practice, two group members did so, and the 2010 survey of group members reported that one found it contributed to their ability to embed sustainability into

their curriculum a little and the other, not at all. It seems that reflection during group and one-to-one discussions was more useful to group members.

As a conclusion to reflection on Cycle 1, a collaborative paper was written by three members of the group and me. This was written about 10 months following the activities of Cycle 1 (during Cycle 2) and considered the process and the achievements of Cycle 1 (see Underwood et al., 2011 in Appendix K).

5.3 Cycle 2: Teaching the Changed Curriculum

Cycle 2 built on the work of Cycle 1 by implementing the approved changes to the curriculum. This involved developing the detail of the planned changes to courses through the learning activities and planned assessment, teaching the changed curriculum and reviewing these. Figure 5.8 is an overall representation of the stages of Cycle 2.

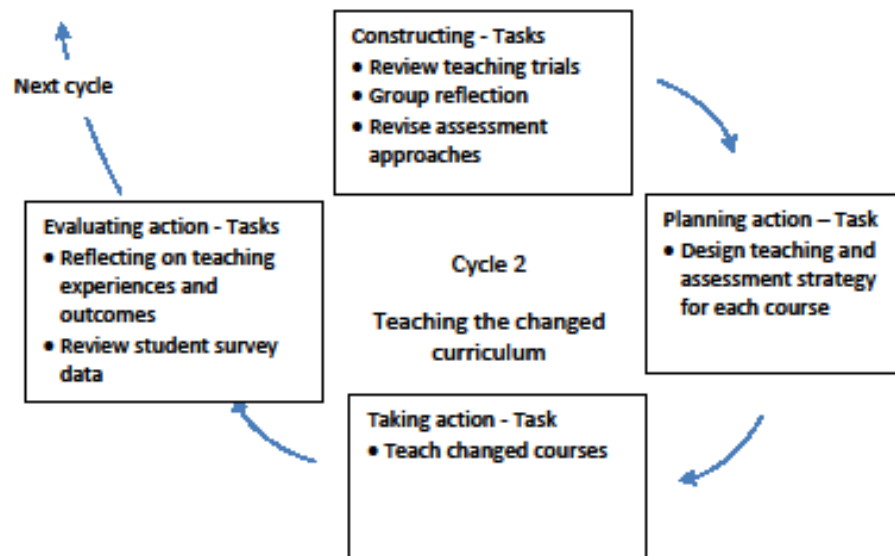


Figure 5.10: Stages of Cycle 2.

5.3.1 Constructing: Reflection on Cycle 1 and reframing

In Cycle 2, constructing involved taking time to clarifying important aspects of the project to inform the next stages. Cycle 1 had provided a range of opportunities for group members to critically reflect on their understandings of sustainability, their sustainability knowledge and skills, their approaches to teaching and curriculum design, and the project overall. By Cycle

2, group members were reframing how they viewed the project work in relation to these reflections.



Review teaching trials: Towards the end of the Cycle 1, group members started preparing student project briefs that included sustainability learning to trial in their teaching the following semester, prior to bringing in the fully revised courses the following year. This is indicated in Figure 5.9.

Group members reflected on their teaching trials individually, with other group members, with the facilitator and in group discussion during workshops. An instance is recorded in my journal and can be found in Appendix L. A group member (AF) had invited me to attend and observe a class of a first-year teaching trial. Following the class we discussed aspects of the class, including use of grading criteria, students' learning engagement, helping students manage scope of the student project, using the SOLO taxonomy to describe learning expectations to students, balancing sustainability learning across the program, and strategies that the group might use to achieve this more effectively. Such discussions did not avoid challenging assumptions about teaching. For instance, in the discussion with AF, my notes state AF noted that some students "got it", while others did not, suggesting the maturity of the students was the problem. I responded that it was the role of the teacher to be very clear about what students were expected to do and learn and suggested the assessment criteria might need to be made more specific to assist students. Hence, these discussions were critical reflections on practice combined with feedback, sharing ideas and problem solving.

This same group member reflected much later in the project how useful this type of discussion had been to improving the teaching in the course, as indicated in the following extract from a reflective account of the project.

Extract from AF's account of project prepared for the journal article:

A key factor in enabling the changes and progression of the [student] brief has been the role of the facilitator. There was a huge advantage and assistance in having the facilitator involved, who challenged staff to reflect on our learning and teaching practice in quite specific ways to get the project rolling along and also to maintain its momentum. This facilitation was initially across a theory base and involved mapping sustainability within our courses and aligning assessment with learning outcomes. But their guidance also ventured into our teaching practice, by sitting in on key briefing and lecture sessions, participating in guided learning activities, attending the final student presentations, and also analysis of assessment criteria. This practical interaction with the facilitator really

impacted on my teaching preparation and habits because it allowed a space to debrief on the clarity of the [student] brief and the reaction of the students.

Group reflection: Group reflection and discussion during workshops, especially in Cycles 1 and 2, was an ongoing aspect of the project and provided the main opportunities for all group members to come together to get an overview of the project. Group discussions included reflecting on project progress, sharing personal research, and relating the project to external stakeholders and activities.

Group discussion arose from specific activities built into the workshop, as well as allowing time to discuss. The group workshops usually included a block of time to share resources, discuss experiences and plan collaborations. The following extract is from Workshop 3, where the value of and a strategy of keeping track of the sustainability learning across the program was discussed:

Facilitator: Does anyone want to recap on what we were just talking about?

AF: We were just going over the checklist [head, heart, hands] that we did? How many months ago?

AC: A while ago.

AF: And we were saying that it is quite a good thing to get an overview of what is happening across the different [courses] and hopefully this morning is going to fill that out a little bit more.

AE: Yes.

AA: And that we could perhaps be more deliberate in developing that as a snapshot that we keep on the wall in the office or something, so if you need to check in at any point about what so-and-so is doing.

AC: About who is doing what.

AA: Then we get a sort of better sense of quickly ascertaining where we are all at.

Revising assessment approaches: Many discussions about sustainability teaching and learning led to discussion about assessment approaches and strategies as indicated in the above example in the teaching trials section. In response, Workshop 5 was held in late 2009 to assist group members to prepare the learning activities and the assessment for the new sustainability related learning outcomes. While Workshop 5 contributed to Cycle 2, it also proved to be the start of Cycle 3, which focussed on assessment, and is discussed further in Cycle 3 to follow.

5.3.2. Planning action: Developing the learning and teaching details of the new courses

In Cycle 2, planning action involved designing a teaching and assessment strategy for the sustainability-related ILOs. This was the task of developing and deciding exactly what student learning would be covered in each course; that is, how the ILO would be expressed or reflected in the course, the learning activities associated with this and the assessment. This was largely an individual pursuit of the group members. That it was done is evidenced by the revised course outlines and student project briefs. An example of these is provided in Appendix H for a single course, which previously included no specific reference to sustainability teaching.

5.3.3 Taking action: Teaching the changed courses

In Cycle 2, taking action involved teaching the new courses as designed. These were taught during semesters 1 and 2 in 2010. Teaching the changed curriculum involved all seven members of the group. All courses with a new sustainability-related learning outcome actively taught sustainability learning except for one course in semester 1.

Teaching observations

As referred to in Chapter 3, I undertook to take two teaching observations for each of the courses that included the new sustainability-related learning outcomes, discussed above. For each semester of teaching the changed curriculum, I gained permission from the group to observe them teaching some aspect of the changed curriculum twice during the course. The observations were initially to confirm that the changed curriculum was being taught to students; however, the observations also became another opportunity for one-to-one discussions between me and individual group members to reflect on and explore aspects of learning and teaching in general and specifically of sustainability learning.

An example of my notes and reflections from observing teaching is found in Appendix G and Appendix M.

5.3.4 Evaluating action: Evaluating the learning and teaching of the new courses

In Cycle 2, evaluating action involved reflecting on group members' experience of teaching the new courses and reviewing student survey data.

Teaching the changed courses for the first time provided substantial material to reflect upon. Teaching was largely reviewed through group workshop discussion primarily in Workshops 6, 7, 8 and 9. The following extracts from workshop transcripts show a range of themes arose

from group members' teaching experiences, indicating group members were interested in evaluating their teaching and in identifying how this could be improved further.

The need to refine and clarify what sustainability learning was covered across the program and within individual courses was identified by group members. This was attributed by group members to a number of reasons. Group members observed the level of understanding expected of students was mismatched in the year level in some cases.

There was also concern there was an unmanageable sustainability overload in some courses.

Extract from transcript of Workshop 7:

AB: Well that idea also of a student studying in first year and moving through it to third year, where are the overlaps? Where are the areas that there are gaps still? Where are, you know... and then I guess starting to look at that depth of learning, like ...

AA: Yeah, I mean that's one of the things that we've noticed is sustainability fatigue in some of our ... it's been a conversational thing rather than a knowledge-based thing, I suppose that we have been anecdotally noticing amongst some of our third year students, so testing whether that's true or not.

Extract from transcript of Workshop 8:

AE: [Sustainability was] [s]ort of always underlying with a lot of the projects that I ran, particularly in second year. There were always elements they that were touching on. But I think, finding that it's covered so well through the other courses that they were finding, the [student cohort of the] year before were finding it a bit overwhelming to have everywhere.

Ensuring that the sustainability learning matched the content of the course also needed consideration.

Extract from transcript of Workshop 7:

AF: And I guess maybe that it is also, it just shows that from year to year depending on the project that we are doing, it is going to vary in the way it comes into the course.

AA, AC, AE: Yes.

AF: I think you've got to look at what is appropriate so they are not getting too much.

AA: Yes.

Facilitator: Or repetition.

AF: Or getting it where it is relevant to the project that they're working on.

Moreover, group members saw a consequence of their growing sustainability awareness and expertise added depth and complexity to their original interpretation of graduate expectations.

Extract from transcript of Workshop 7:

AB: Because our knowledge base is getting better.

Extract from transcript of Workshop 8:

AB: I'm bringing new technology [into the course], like that link of new technology plus materials plus research plus the traditional recycle, that space. So I think the outcomes were more sophisticated. I guess the area for me, the criticism if any, from last year's project was it's the economics that we rarely touch, like we talk about sustainability ...

Consequently, group members raised the need to re-map the sustainability learning within courses and make this more consistent with the graduate expectations (Head, Heart and Hand).

Extract from transcript of Workshop 7:

AA: And I think the 'how deep do you want to go' thing makes more sense to do after every mapping anyway because you get a sense of what everybody is actually up to and how deep they are going currently in a sense and the flow on, yes.

AB: Yes, at the program level and the connection that each course has to the broader program, because there are certain courses that are central, and there are others that are engaged but in different levels.

Engaging with industry and investigating industry practice effectively to support sustainability learning was raised by group members as an area of strength within the program but also an area which could be utilised more.

Extract from transcript of Workshop 7:

AA: ... when we were talking last week in second year with their [student] project again, there was the "let's look online and see what the claims are that these companies are making". One company was claiming, you know, "we are using electric light bulbs that save power" and they were saying "well that's duh, that should be in place already", so that shows another level of sophistication that students 12 months prior didn't have.

Extract from transcript of Workshop 8:

AD: ... [it is] about posing a question and having people to discuss and debating and things like that... So bringing [industry] people in to do that, who have an expertise and really challenging the students to think about things ...

Enriching sustainability learning experience and complexity was achieved through collaboration across courses.

Extract from transcript of Workshop 8:

AD: I think, um, the connections formed between first-year CAD, Studio and Industry and Tech at the end of last year were good, so the [student project], [another student project] and [group member's] research project were all related, they were all looking at the t-shirt but in different ways. That worked and the reports that the first years wrote and the rationale behind the design process was pretty good.

Group members discussed how their teaching of sustainability learning was supported by encouraging students to work in more self-directed and questioning ways.

Extract from transcript of Workshop 8:

AA: [We need to consider] not also overwhelming them with a sense that they should know the answer. Because I think that can be ... [left unfinished]

AC: I think it's more about, I mean, it's more about us showing them how to research and how to ask, ask critical questions and apply thinking rather than ...

AA: Yes [rather than] having the answer.

It was reiterated among the group in reflections on their teaching experience that sustainability learning needs to be designed into courses with a whole-of-program perspective.

Extract from transcript of Workshop 8:

AF: I guess, it is again, that finding, well what project does it come into?

AA: It's about that balance.

AF: It's not into everything ...

AE: Yes, and it [sustainability learning] should really be in a context.

AE: Which one does it come into and can be covered well and engage students, but if you try to do it across the curriculum.

AA: Across everything, yeah so, I think, you know, if we do that we are going to have to think about as a group how that decision is taken, rather than individually thinking about it for each of our subjects.

The group also identified the importance of scaffolding students' learning, and to encourage students to recognise their own learning (Harland, 2003).

Extract from transcript of Workshop 8:

AA: But it's about suggesting a series of stepping stones to start with. You know, okay, well, where are the places that you might start looking and having that as a conversation as a group with them first, so that they are reassured that they, or reminded that they have those skills.

AC: And I also think I decided to bring in the timeline exercise in March, I want to do that in the first week, because it's reassuring them that they have learned from ... that they do have a wealth of knowledge, because once we did that exercise as well, that was the "oh, we actually have all of this information at our fingertips and our group's a pretty smart group and we can do all of this", it's great for them. And it saves time and effort on my part.

Group members also reiterated the need to reflect on assessment. This is discussed in detail in 5.4 Cycle 3: Enhancing assessment practices.

Group members reviewed and reflected on student learning in a number of ways. As teachers of the courses they coordinated, they assessed their students' work. This was typically done by the individual group members and then moderated by a colleague. Students' actual results are not part of this study; yet, group members were aware of their students' and overall class results. The project provided two additional ways to review student learning. First were the results of the student surveys, which indicated students' understandings of sustainability and their positions on a number of sustainability issues at three points in the academic year when the changed courses were implemented. These were presented and discussed in Workshops 8 and 9. See Appendices F and G for the complete set of results and analysis of the student surveys.

Group members' engagement in the review of the student learning is indicated by their discussion and reflection in relevant workshop transcripts and particularly in how this review emphasised the need for enhancing assessment practices, the focus of Cycle 3. Some extracts have been included here to demonstrate the group's evaluation of the student learning.

In relation to the student survey results, the following extract is a discussion of third-year students' responses to the statement "I feel I could manage a mass market/commercial textile design project using sustainable methods and products", which produced low agreement from students. The extract suggests to the group that those students did not feel equipped in their learning to contribute to large-scale sustainability practices in their profession. The group member suggests this shows students may have become more aware of, that is learnt about, the challenges of sustainable practice and that this is a more realistic basis on which to proceed. It was also suggested to group members that this is a gap in the students' confidence to practice.

Extract from transcript of Workshop 8:

Facilitator: When you are talking about the third years, these are students who ... are going into industry now and we have seen, no-one is strongly agreeing they could do that, they feel they could do that. Then you see a slight shift in the second semester to positive and then it sort of slips back a little bit.

AA: But that's after [an industry project] ...

AE: Yeah, but that's after experiencing that they probably can't do it. You probably couldn't, we probably couldn't.

AA: It's after the experience ... the students that took it on, fed back to the rest of the group, there was a feedback session, saying look these were the things that we learnt, this was the possibility, and the bottom line is we don't think the company is going to change anyway. So I think that's very easily explained.

AE: Yeah, from their experience.

Facilitator: And is that still useful?

AA: I think it's still useful.

Facilitator: Yeah?

AA: I mean, I think it's a bit sad, but I think there's a kind of a real reality check there because it was a big commercial company that they were dealing with.

In the following extract, group members reflected on student responses to a particular question and followed it by considering developing a shared digital resource across the program to enhancing student sustainability learning.

Extract from transcript of Workshop 9:

AC: Awareness ... well that is reflecting their learning in second semester, isn't it? They have gone from none to a great deal.

AA: I reckon if we ask that question this year we would get a vastly different response.

Facilitator: More case studies, more examples.

LA: More, I think there's been more investigation into that resource aspect.

Facilitator: I mean they still don't get to 4, they're still not agreeing, ...

AC: I mean does that come down to something that we actually have to really encourage them to build? You know, we have had these conversations about the wiki, we have the program building a whole series of resources and I know they do it in various projects, but maybe it is something that we look at encouraging. Here is our primer, that the program has developed all of these design practices or companies that are involved in sustainable practice. Maybe we do have to be a bit more overt about it.

Evaluation
of student
assessment

A further review of student learning was provided by the evaluation of student work for courses that included sustainability ILOs. This was conducted at the end of the second semester of 2010, as indicated in Figure 5.11. The review was conducted by the facilitator and another reviewer (also my supervisor) and details of how this was undertaken are included in Chapter 3 in the section "Conducting the evaluation of student work". Results of the evaluation of student work are provided in Appendix I. In summary, the evaluation of student learning suggested students were addressing the sustainability aspects of their courses in their assessment. The standard of the sustainability learning, however, was mixed across the courses and low in some cases. Feedback sessions held between the facilitator, the other reviewer and individual group members discussed the evaluation findings of the group member's course and the learning and teaching implications of these, and also discussed assessment approaches in light of the evaluation findings. These feedback sessions contributed to creating the impetus for enhancing assessment approaches, addressed in Cycle 3. In the following transcript extract, a group member explains to the group how these feedback sessions motivated the group member to review their assessment approach.

Extract from transcript of Workshop 8:

AD: Well the rationale for doing it [enhancing assessment approaches] sort of came about from talking to Fiona [facilitator] and [co-reviewer] last year about holistic assessment and that idea was really interesting and I wanted to find out more about it so I read a couple of [the co-reviewer's] papers and found some really relevant information

that we would apply to textile design. And [AF] was really keen to create a set of standards for the grades.

5.3.5 Complementary activities contributing to Cycle 2

As in Cycle 1, Cycle 2 included a number of activities which were complementary to the formal aspects of the curriculum change. These are represented in Figure 5.11, with a brief description of each following.

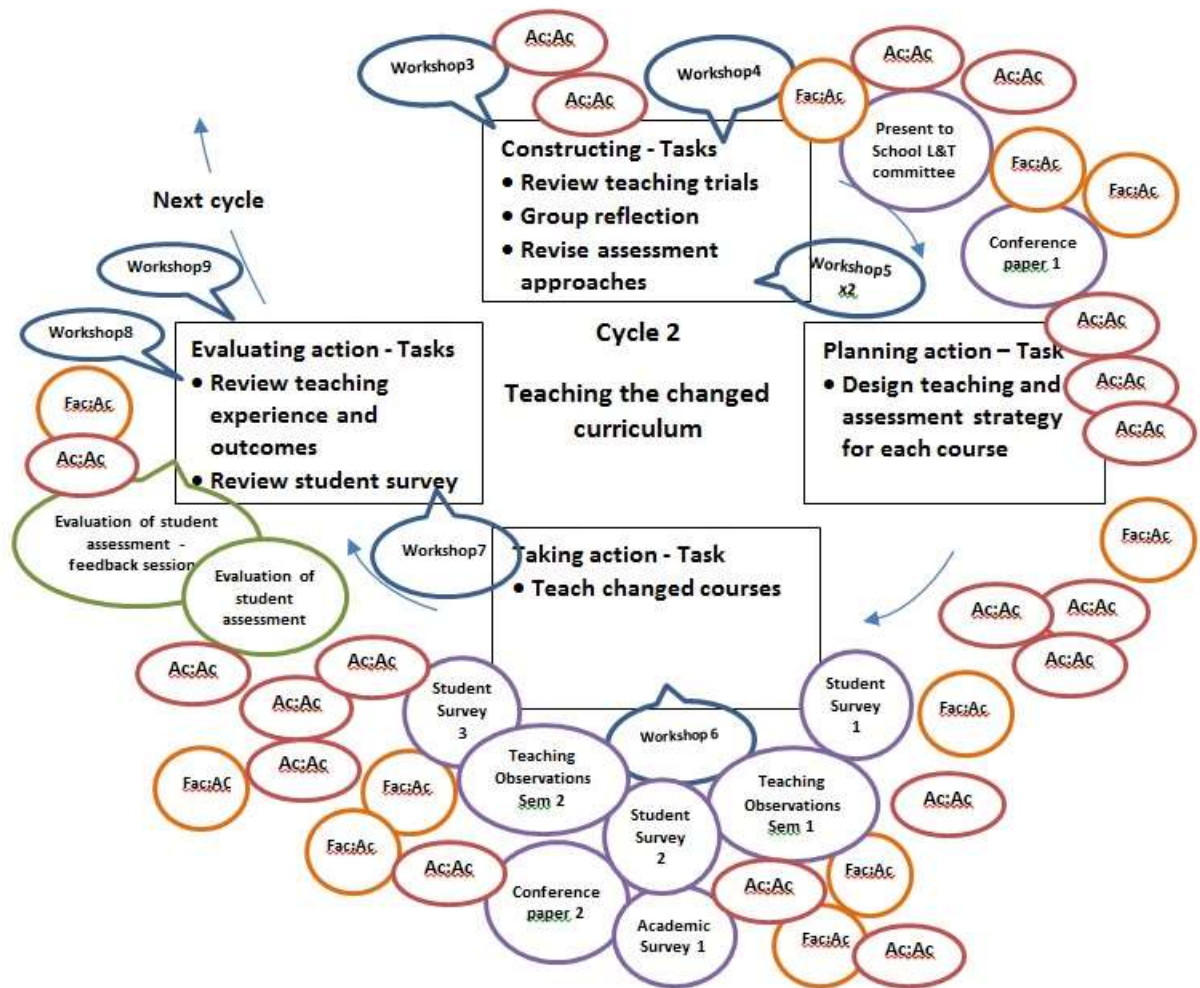



Figure 5.11: Stages of Cycle 2 including complementary activities.


Ac:Ac Again, individual group members discussing and/or working together on aspects of sustainability learning and the project were a feature of Cycle 2, as well as individual group members discussing and/or working with me, the facilitator.


Fac:Ac Again, the number of these symbols is an indication of the relative frequency of these collaborations during the cycle, and not the actual number of these collaborations.

Present to School L&T committee The group had been invited to present the project work-to-date to the school's Learning and Teaching Committee. Three members of the group and the

facilitator reviewed the work-to-date and prepared a report and presentation which was well received by the committee.

 As outlined in Chapter 3, all TD students were surveyed using the same instrument at three points during 2010. The survey aimed to ascertain students' understandings of sustainability and whether these had changed over the teaching periods. The pre-survey was administered at the start of semester 1, before students had experienced the changed curriculum. The second survey was administered at the start of semester 2 and the third, the post-survey was administered at the end of semester 2. The data from the surveys was analysed by myself and reported back to the group in two stages. Some pre-survey quantitative data was reported back during semester 1. The complete results of the three surveys were reported back to the group the following year.

 Two peer-reviewed conference papers were co-authored by the facilitator and members of the group during Cycle 2. The papers considered different aspects of the project and were conceived out of reflection on practice. The first paper arose from the co-teaching a group member and I had undertaken during Cycle 1 (Wahr & Underwood, 2010), see Appendix J. The second paper reflected on the group's action research process during Cycle 1 (Underwood et al., 2011), see Appendix K.

 The first survey of the group members was undertaken during Cycle 1. This explored their experience of the project generally, as well as particular activities. The survey also asked about changes they might have experienced and their perceptions on the progress of the project. The survey was conducted to provide the facilitator with data on the progress of the project. Similar to the teaching observations, the survey provided a further opportunity for group members to reflect on the project.

5.4 Cycle 3: Enhancing assessment practices

Cycle 3 focussed on enhancing assessment practices within the program to support sustainability learning in the first instance, and also across the whole curriculum. Cycle 3 built on and also overlapped the assessment-related work of Cycle 2 and built on the work of Cycle 1. Overlapping or non-linear cycles often occur in action research (Kemmis et al., 2014). Figure 5.12 is an overall representation of the stages of Cycle 3. This cycle has fewer group tasks associated with it, yet one-to-one discussions between group members were numerous among group members and to a lesser extent between group members and the facilitator as the work to enhance assessment progressed.

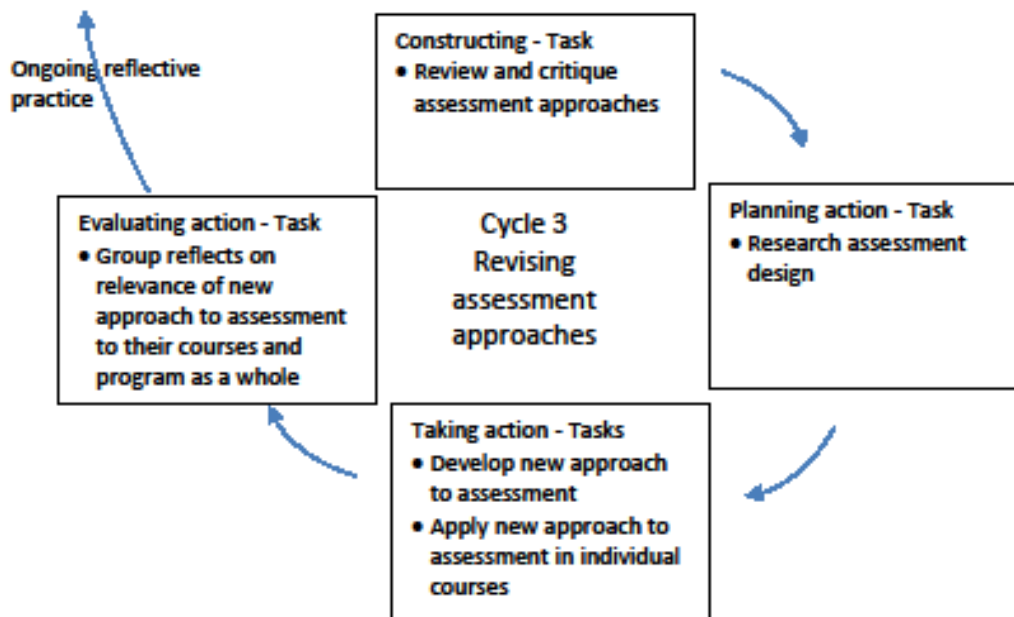


Figure 5.12: Stages of Cycle 3.

5.4.1 Constructing: Review understandings of purpose and practice of assessment

The constructing stage in Cycle 3 involved reflection on assessment approaches in the program and identifying a need to enhance these.

Over the course of Cycles 1 and 2, the project applied a framework for learning and teaching that included facilitated critique of assessment practices. This suggested or highlighted areas for improvement in relation to assessment. Subsequently, some members of the group identified a need for and pursued improvements to their assessment practices. The whole-of-program approach to the project meant these group members were comfortable to share their work with others in the group for the program as a whole to be reviewed and improved. In practice then, the project created an impetus for group members to review their assessment practices, and the project had also created a supportive collaborative environment to share the work, develop the work further and progress to whole-of-program improvements as other group members became more engaged with the issue of assessment improvement.

Student assessment had been discussed throughout the project, especially in relation to constructive alignment. As early as Workshop 2, some group members identified assessment

as a focus for them. Assessment was an issue of growing importance for the curriculum change as the project progressed.

Extract from transcript of Workshop 2:

AD: The other thing that I thought, because I had read through of links that you put in the other day and I think we do a bit of that anyway. But it is nice to actually know there is a language for it and to be able to read up on it, but I think that maybe what we could do today is just talk about how we assess.... So in those examples of how to set up a rubric and how you allocate grades to a particular criterion, it doesn't really work in a way. So maybe we just need to have a bit of a chat about how we assess and if we are going to go down that road of using those rubrics that are attached to the ILOs and LAs, then we need to have a better system.

A workshop focussing on assessment (Workshop 5) was run twice in late 2009 (to allow everyone the chance to attend). Workshop 5 aimed to assist group members to prepare their teaching strategies and plans for 2010. So while Workshop 5 can be seen to support the development of learning and teaching strategies in the constructing stage of Cycle 2, it can also be seen as contributing significantly to the constructing stage of Cycle 3.

In Workshop 5, the assessment workshops, the facilitator reflected back to the group, some of the concerns they had raised about changing assessment practice in earlier discussions (see Figure 5.13, a slide from Workshop 5).

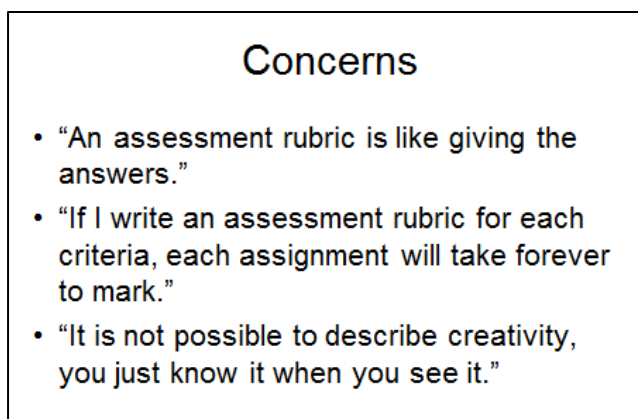


Figure 5.13: List of concerns regarding assessment, presented in Workshop 5.

During Workshop 5, group members were encouraged to challenge their understandings of assessment and assessment practice. Figures 5.14 and 5.15 illustrate the questions used to critically frame this discussion.

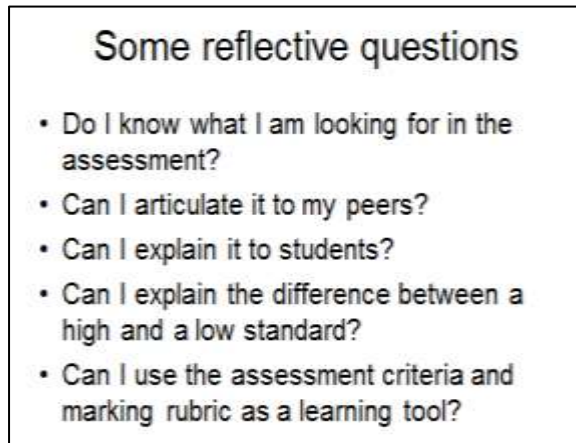


Figure 5.14: Reflective questions, discussed in Workshop 5.

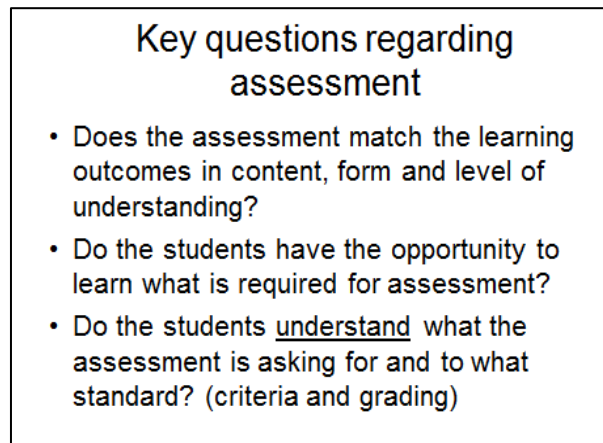


Figure 5.15: Key questions regarding assessment, discussed in Workshop 5.

During Cycle 2 assessment approaches often arose during one-to-one discussions with the facilitator, and among group members. An example is indicated in a discussion following teaching observations see Appendix N.

5.4.2 Planning action: Researching assessment design

In Cycle 3, planning action involved researching assessment design. As noted in Chapter 3, individuals' participation will vary (Reason, 1988) and in this stage of the cycle, two group members took the lead to research. These two group members (referred to as the assessment leaders) independently explored and researched assessment and through their own action research they developed an entirely novel assessment approach for the program. Their approach includes an innovative way to consider TD learning that contextualises sustainability and by embedding sustainability in the curriculum. This is described in the following extract.

Extract from transcript of Workshop 9:

Group member: The “what next” is probably the next iteration of the curriculum, you know, and that feeds into a broader “How do we restructure the program?” ...

Another group member: In the rubrics, [assessment leader name], that you and [other assessment leader] have been using ... sustainability [is] in the underlying design?

Assessment leader: The rubric has basically got only three [overarching] criteria; the process, the product (which is whatever the final outcome is), and the student, and there is a specific section which deals with sustainability in the product [criterion].... [A]nd that is just a given that sustainability is in there nowadays.

The assessment leaders presented their initial findings and plan to the group in Workshops 8 and a more developed version in Workshop 9. They introduced assessment rubrics, including assessment criteria and grading standards for each for their courses. The following extract is taken from the transcript of Workshop 8, where one of the assessment leaders is explaining their research and encourages others to explore and consider the approach for themselves:

Assessment leader: ... sort of determining what's really important in the assessment, ... so many bits to assess, so identifying maybe one or two key things in the intended learning outcome that means in the assessment rubric you can create a series of statements based on that, so when the students get their brief and they get their assessment rubrics they can go, "Okay, so to get a high distinction I've got to demonstrate I can do this and ... simply by going to the internet and downloading a whole bunch of screen grabs, or taking a whole bunch of screen grabs, that's not going to get me a high distinction because I need to reference correctly, analyse, contrast, compare" ...

The assessment leader locates the use of the rubric in practice, and their confidence that the new approach will address practical learning and teaching problems comes through from the extract.

The efforts of the assessment leaders were appreciated by the group.

Extract from transcript of Workshop 8:

Group member: And can I say upfront, thank you to [assessment leader name] and [assessment leader name] for all the work you've done.

The role of the facilitator still provided a critical friend/guiding role in this enhancement process, as indicated in the following workshop extract.

Extract from transcript of Workshop 9:

Group member: Assessment leader [group member name] and I felt that we were going into third year we could probably ease off a little because third year is more about being self-directed, but Fiona [facilitator] still felt that it was too vague. And maybe there

needed to be some areas, or some requirements, within the brief that really forced them to synthesise their learning into like a report or a paper or something like that.

5.4.3 Taking action: Developing and applying new assessment approaches

In Cycle 3, taking action involved individual group members developing assessment criteria and rubrics for their courses and applying these in individual courses. The following extract shows an assessment leader suggesting the group look at introducing a consistent assessment approach across the program and encouraging others to become involved. Here the assessment leaders are taking the initial action to support change.

Extract from transcript of Workshop 8:

Assessment leader: I also downloaded the overarching assessment principles put together by RMIT and I think that we do it all anyway. So it's good to know that we are on track with what RMIT is expecting from us, so, we were thinking about trialling it in first year if [group member name] you are interested and [group member name] you are interested.

Assessment change occurred at different times for different people within a window of a few semesters. The assessment leaders implemented the new approach in the next semester in 2011. Others were not yet ready to make changes. It was the decision of each group member to make the changes, if at all and when. Each group member would need to explore ideas about assessment and make sense of these in their own courses. The following extract shows a group member who had considered the work of the assessment leaders and intended to implement the use of rubrics, based on the success of the work of the assessment leaders.

Extract from transcript of Workshop 9:

Group member: But for you Fiona anecdotally, I have had students who have responded enormously to the rubric [presented in other courses] and love it, and in fact have asked me in [my course], where is the rubric posted for this? Which of course, doesn't exist in [my course]... My plan for next year certainly is to develop a rubric for [my course in] second year. And I think it is worth looking at the third year as well, but in a different kind of way.

Group members also developed assessment rubrics based on the framework provided by the assessment leaders. An example of these can be found in Appendix H.

5.4.4 Evaluating action: Reflecting on new assessment approaches

In Cycle 3, evaluating action involved the group reflecting on the relevance of the new approach to assessment for their courses and program as a whole. Essentially, this refers to

demonstrating the embedding of the new assessment approach into the program. In addition to the assessment leaders, other group members took up the use of the common approach to assessment rubrics across the program and continued to work with and enhance the rubrics to better reflect the ILOs for the courses and the program overall. Following are accounts of how this occurred for two group members, based on their reflections in the collaboratively authored paper associated with the project (Wahr et al., 2013). Appendix O provides a copy of this paper.

The first account shows a shifting awareness for the group member to see the need for deep learning approaches that teach sustainability as a core component of TD with specific ILOs that are framed within an appropriate assessment approach:

I trialed a small sustainability task within the third year textile design course ... I thought that including a question around sustainability was a way to make sustainability a conscious part of the students' design process.... At the end of the project, I felt the task hadn't really added a lot overall.

... I consider sustainability core to my teaching practice.... I taught within a first-year course ..., concepts relating to sustainability and how to develop design strategies and solutions. I felt I had a solid theoretical knowledge and was confident within this space. In contrast, the third-year course did not have a significant sustainability learning component and was not being assessed. I was unsure how to provide a deep engagement with sustainability within this practice-led design context.

... I realised I needed to overhaul the ... course's overall learning and assessment outcomes. My focus has shifted ... to realising I needed to scaffold the student experience and align learning outcomes to assessment. My [revised] aim was to ensure sustainability was not an add-on and that the assessment was meaningful.... I didn't want to limit students with a narrow interpretation of sustainability.... For me, the embedding of sustainability has led to redefining what sustainability means for textile design practice.

As the project has evolved.... Through iterations of the design project my awareness and knowledge around both learning theory and sustainability has increased.

Based on the course evaluation surveys, students have responded very positively to this approach.... Students can see that what they are learning and the learning outcomes are relevant. (Wahr et al., 2013, pp. 107–110)

The second account is represented visually in Figure 5.14. The figure shows engagement with the use of assessment rubrics towards the end of 2011 into 2012 as part of their ongoing learning and teaching reflective practice.

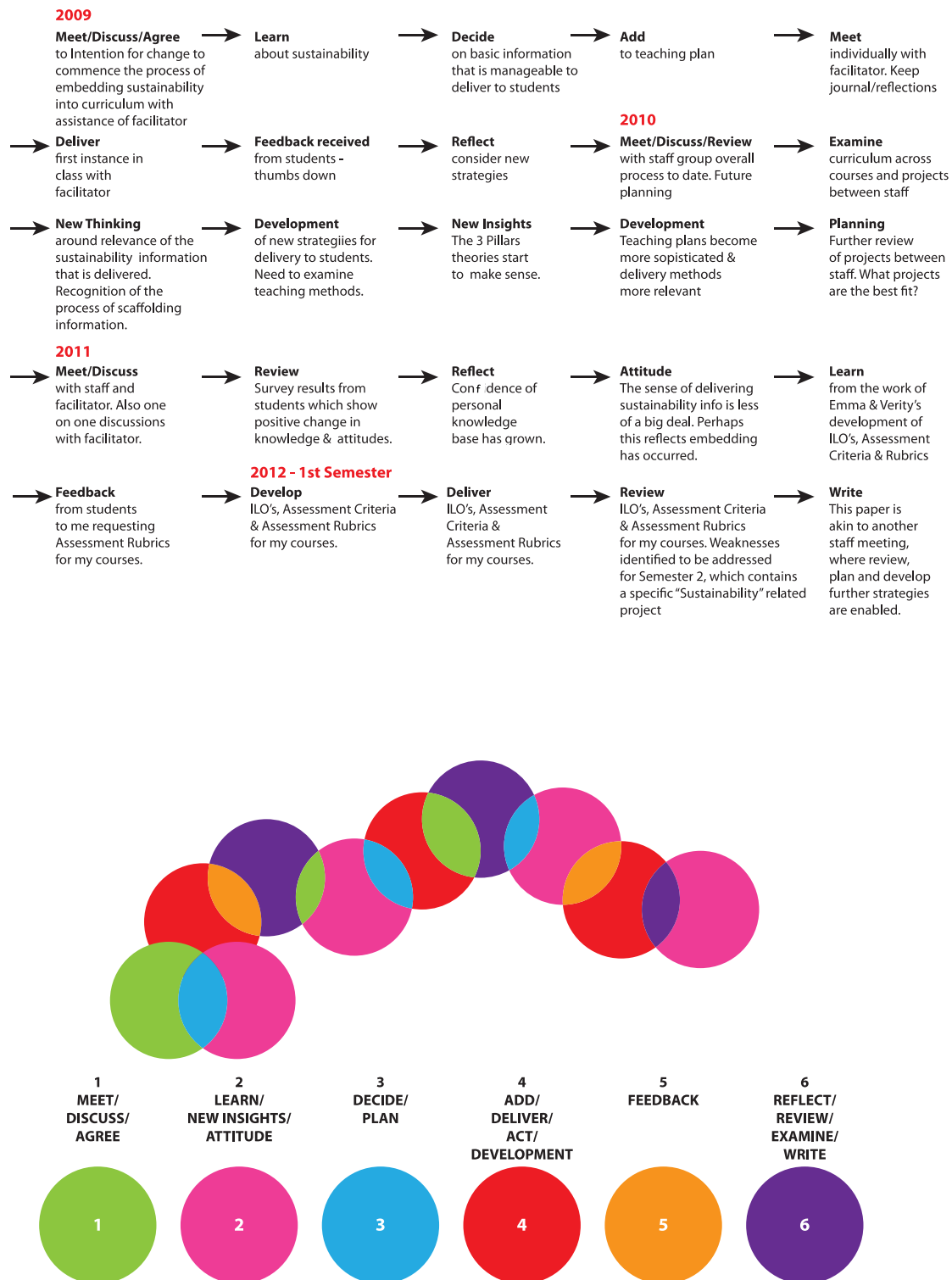


Figure 5.16: Representation of one group member's experience of the project. Note: © Luise Adams, 2012. Reproduced with permission.

Essentially, the project and especially Cycle 3 set up the group for ongoing improvement. This accords with Bath et al., that "... something more than one-shot mapping and embedding is needed to ensure that embedded graduate attribute development is continuously reviewed and renewed" (2004, p. 325).

5.4.5 Complementary activities contributing to Cycle 3

Cycle 3 also included a number of activities that were complementary to the formal aspects of the curriculum change. These are represented in Figure 5.18, with a brief description of new activities following.

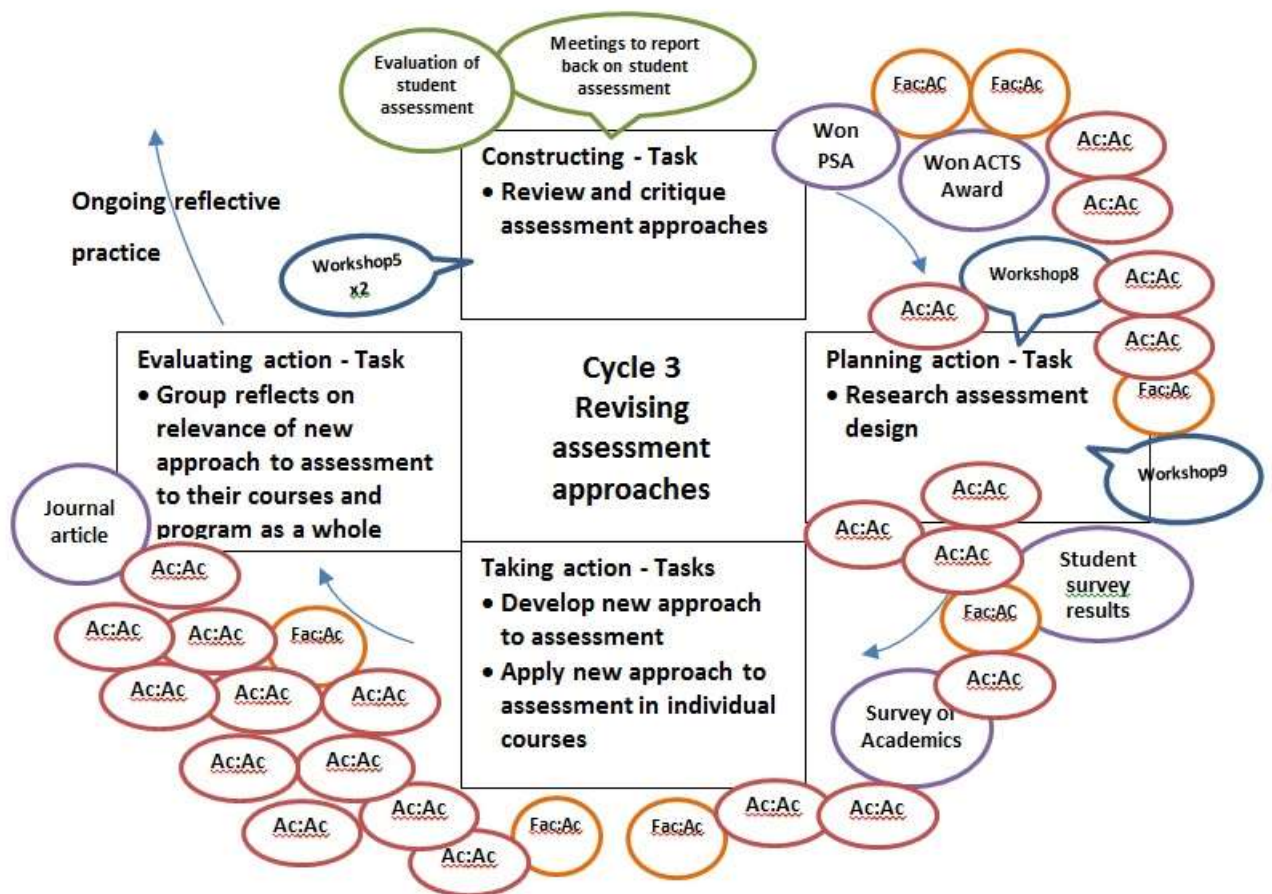



Figure 5.17: Stages of Cycle 3 including complementary activities.

 Won PSA Award At this time, calls were made within RMIT to apply for the 2011 Victorian Premier’s Sustainability Award (PSA). As facilitator, I believed the project met the criteria and an application would be at least a worthwhile exercise to document our

practice. I encouraged the group to apply in the Tertiary Education Category. Three group members and I worked on the application, which subsequently won (Sustainability Victoria, 2012). All group members and I attended the PSA dinner and ceremony.

Won ACTS Award

Following the success of the PSA award, two group members submitted another award application. The group subsequently won the 2011 Australian Campuses Towards Sustainability (ACTS) Learning and Teaching Award, which recognised “achievements in education for sustainability in undergraduate, postgraduate and vocational courses in Further and Higher Education” (Australian Campuses Towards Sustainability, 2011, p. 6).

Student survey results presented

During Workshop 9, when the group reviewed the complete results of the three student surveys, it was suggested that the results be presented to the students, as well as to the School Learning and Teaching Committee. I prepared and presented an abridged version of the results twice, with the support of the group: once for students and once for the School Learning and Teaching Committee. For an analysis of the results of the student survey see Appendix E and Appendix F.

Survey of Academics

In mid-2012, the second and final survey of group members was administered. The survey focussed on individuals’ experience of and achievements arising from the project overall. All group members completed the survey. See Appendix D for the results.

Journal article

Towards the end of Cycle 3, three group members and I co-authored a peer-reviewed journal article (Wahr et al., 2013), see Appendix O. For the article, the three group members prepared deeply reflective accounts of their experience of the project in relation to their teaching practice and engagement with sustainability learning up to and including 2012. These reflective accounts were worthwhile in themselves, as the group members observed significant changes to the program and their teaching during the project. We analysed these accounts to determine the forms of reflection inherent in the accounts-based frameworks described by Mezirow (1990) and Cranton (2006). The article then explored and demonstrated the extent and form of transformation experienced as a result of the project, concluding that those group members had experienced transformative change.

This journal article provided core data for the project overall, but specifically for Cycle 3. The article demonstrated the reflective practice of group members and the shifts in their understandings and changes. In particular, group members referred to a changed appreciation

of the significance of assessment practices to student learning and that these take time to bring into practice and achieve results for individual group members.

5.5 Reflections on the Cyclical Process

The aim of each cycle was to lead and support sustainability-related curriculum change. Each cycle progressed these aims by building in an additional step of curriculum change. The cycles provided concrete approaches and strategies to bring about the curriculum change as well as opportunities for group members to develop their own sustainability understandings and teaching practices. Cycle 1 focussed on developing understandings of sustainability in relation to TD in order to identify appropriate sustainability-related ILOs for the program. Cycle 2 focussed on bringing those ILOs into the student learning experience as group members taught the new ILOs in their courses. Teaching the new ILOs included assessing the sustainability learning. Cycle 3 considered the need to enhance assessment approaches and practices.

Throughout the cycles, in my role as facilitator, I sought to create the time and space for group members to consider the nature of sustainability and learning and teaching and how these relate to their curriculum. During the cycles, suggestions and concerns would be raised and the group would consider these and toss them around. Sometimes the group resolved issues on the spot and committed to action. Sometimes issues were left gently ‘hanging in the air’, not dismissed, but also not dealt with either, leaving us to reflect upon these in our own time. Some we came back to in time, while the significance of others diminished over time, and others were put in the too-hard basket. And yet others were brought back, discussed robustly and struggled over until an agreed outcome is achieved.

Across the three cycles, the role of the facilitator in initiating, guiding and supporting the curriculum change process necessarily diminishes. In Cycles 1 and 2 the facilitator, in conjunction with the group, actively developed and implemented the tasks and activities to support the work of the cycles. The role of the facilitator in Cycle 3, however, became significantly less interventionist than the earlier cycles. In Cycle 3, group members took more of a lead in determining the focus and form of the groups’ work. This shift was not overt, discussed or planned. The shift was organic, driven tacitly by the active engagement of the group to address a need they had identified. That the group led learning- and teaching-related changes in Cycle 3 indicates their capacity and empowerment to do so. The facilitator was able to start to withdraw from the project towards the end of Cycle 2 and had only limited involvement after this time.

In most cases ... [the guidance of the researcher] will at first be rather important, but will diminish as the participants gain knowledge and experience prepare.... [t]o prepare the participants in such a way that the participants can take over the work themselves when the researcher leaves the group ... (Burns, 2000, p. 455)

As the facilitator, I continued what I had done throughout the project: to provide a critical friend and expert resource to the group for exploring issues relating to learning and teaching and sustainability learning. The facilitator's involvement in the project ended following the last collaborative activity of Cycle 3, that of submitting the journal article in late 2012.

The ability to remap sustainability learning in the program more comprehensively relied on this review of assessment approaches. It was only through developing the assessment rubrics that it was possible to be clear about what sustainability learning was intended in each course, and then to have the conversation of what was really going on in the program as a whole. This provides an example of learning and teaching progressing the sustainability agenda because working on assessment required the group to think very clearly about what they were expecting students to learn and then how they would express this to students.

The enhancing assessment work undertaken in Cycle 3 closed the curriculum change loop started in Cycle 1, namely, to identify the extent of sustainability learning required by TD students. Cycle 3 set up the group to revisit these notions about sustainability in the discipline and to remap the program accordingly. The need to continually refine is acknowledged and applied, driven by the enhanced assessment approach.

5.6 Evaluating the Project

The previous discussion has sought to demonstrate a range of project outcomes, including the project impact. This evaluation section summarises the project outcomes by establishing the nature and extent of impact of the professional learning arising from project, according to the evaluation framework presented in Chapter 3. The evaluation thus provides a basis to comment on the usefulness of the embedded model and informs the discussion in Chapter 6 of how and why the model worked.

Notably, there is a tremendous amount of data and implications arising from the project that could be reported on and discussed in evaluating the project. Three-plus year's of group interaction and deep collaboration has produced a huge amount of data and many ideas. In this chapter, discussion is limited to the key aspects required to demonstrate achievement of sustainability learning.

Evaluating the impact of the professional learning is presented first. Impact of the professional learning arising from the project is now reported at all four levels of the Kirkpatrick and Kirkpatrick model (2006), as described in Chapter 3.

The last section of the evaluation deals with internal validation of the project as experienced by the group members, as participants of action research.

5.6.1 Reactions

Reactions refer to the extent participants respond favourably to the learning event. In this case, reactions are discussed in terms of group members' perceptions of and satisfaction with the project.

There was a high degree of participant satisfaction of the project experience. That participants continued to be involved over the extended duration of the project suggests they generally saw value in participating. As shown in Chapter 5, attendance at the workshops and other activities was extremely high. All workshops were attended by all members of the group, with the exception of the occasional participant who had other commitments or was on leave.

Surveys of group members during and at the conclusion of the project also indicate satisfaction. Well into the project, the 2010 survey of group members found all participants agreed to the following statements: "I understood the objectives of the project", "The project has been relevant to my teaching", "The project provided me with a supportive environment to learn more about sustainability education in textile design", and "It felt good to be involved in the project". Further, they indicated confidence in their ability to teach sustainability.

Later, in the concluding 2012 survey, all participants reported positive experiences of and outcomes from the project. In the same survey, while responding to a question asking how the project might have been improved, participants provided constructive feedback with suggestions for small adjustments to aspects of the project, or left the question unanswered. No substantial changes to the project were suggested.

There were, however, times during the project when participants felt the project was making demands on them. Reflecting on the project as a whole, one respondent reported the following: "[I'm][n]ot going to deny that the project was challenging at times. Fitting in the meetings, keeping to deadlines, rewriting course outlines, content and projects ..."

(Respondent 5, 2012 survey). But such difficulties are seen as acceptable in light of the support to undertake the project; Respondent 5 continues:

... But it was rewarding to have committed as a staff group and to keep each other on track. There was a huge advantage and assistance in having a facilitator (maybe the better description is mentor) who challenged us to reflect on our L&T practice in quite specific ways to get the project rolling along and also to maintain its momentum.

There were also tensions and difficulties during the project that I, as facilitator, was aware of, which are not reflected in the surveys. For instance, feedback sessions with participants regarding the external evaluation of their students' work and assessment in general, included moments of strong, palpable tension, and perhaps even ill feeling, for some group members. Yet, 18 months later, survey responses did not contain any discord. Rather, the surveys report positively on the assessment-related work done during the project, suggesting participants saw significant improvement in their assessment practices as a result of the project. Perhaps this is an example of initial dissonance, which with time and reflection, shifted or transformed. Issues concerning maintaining momentum and engagement are discussed in section 6.4. These tensions are seen as a normal part of an ongoing process, and hence overall there was satisfaction among participants in relation to the project.

5.6.2 Learning

Learning refers to the degree participants acquire the intended knowledge, skills and attitudes based on their participation in the learning event. In the case learning is considered in terms of:

- participants' beliefs about learning and teaching;
- participants' beliefs about sustainability learning and knowledge of sustainability.

Participants' beliefs about learning and teaching. Group members reported changes in their understandings of learning and teaching, sustainability learning and sustainability at the end of project. In the final 2012 survey, group members referred to positive achievements, including greater understanding of learning and teaching theory and its practice. As part of the curriculum change, all participants reported the learning and teaching professional learning focus, or some aspect of learning and teaching improvement as among the three most important things they learnt from their involvement in the project: "Developing ILOs, constructive alignment" (Respondent 1, 2012 survey), "the L & T framework" (Respondent 7, 2012 survey). Some observed that their learning and teaching development enabled them

to embed sustainability and curriculum; for example: “[I] [d]eveloped my L&T theory and language, and experienced how useful this was to enrich, support and make sense of the way sustainability could be integrated into my courses/projects” (Respondent 4, 2012 survey); and this: “Consideration of methods with regards to teaching delivery to enable sustainability learning” (Respondent 3, 2012 survey).

The study suggests that despite group members’ teaching experience, a focus on learning and teaching was an important literacy necessary for group members to develop in order to engage in curriculum change. Even more importantly, this suggests the next step in evaluating assessment reinforces the process of embedding sustainability as it provides academics with compelling data upon which to critically reflect on their students’ learning. The literature reports earlier curriculum change studies that finish, having evaluated learning outcomes and learning activities. While these are important stepping stones in curriculum change, they are not the end of this story. From the comments of group members, taking the next step of including assessment evaluation was pivotal to engaging in the process of embedding sustainability. This study highlights the need to close the curriculum loop by including assessment design and evaluation to support the process of embedding sustainability. The 2012 survey asked group members to reflect on the successful outcomes for their courses and teaching arising from the curriculum and teaching changes associated with the project. Group members referred to this connection between assessment and embedding: “[c]onstructive alignment [led me to] really thinking about what it was that you were assessing students on” (Respondent 1, 2012 survey).

Participants’ beliefs about sustainability learning and knowledge of sustainability: Shifts in group members’ reported beliefs about sustainability and understandings of sustainability learning were also observed during the evaluation phase of the project. The following extracts suggest understandings of sustainability becoming more aware of the scope and extent of sustainability:

AB: ... our knowledge base is getting better ... And we are getting more sophisticated, whereas I think when we started the project it was very much environment and resource management, waste minimisation.... And it seems increasingly we are shifting towards ethics ... and supply chain and all these other elements of economics. (Extract from Workshop 4)

AA: And I think the “How deep do you want to go thing?” makes more sense to do after every mapping anyway because you get a sense of what everybody is actually up to and how deep they are going currently in a sense. (Extract from transcript of Workshop 4)

5.6.3 Behaviour

Behaviour refers to the degree to which group members apply what they learned during training when they are back on the job. In this case, behaviour is reflected in:

- curriculum change;
- enactment of the new curriculum.

In relation to learning and teaching practice and sustainability learning, it is clear that group members moved beyond declarative knowledge, in that they also applied their learning to the curriculum change process. This was evident in both the written curriculum and in observations of group members teaching the new curriculum.

Curriculum change: The curriculum change stage of the project project resulted in 16 courses moving to include some aspect of sustainability learning specifically contextualised to the TD discipline. The course guides were formally changed to include the sustainability-related learning outcomes. For each course, these were described generically, consistent with other learning outcomes, to allow for the contextualisation of the sustainability learning to the specific themes covered in the course in a given offering.

The validity of the ILOs was not tested independently by any external party, although this was discussed as an option available to the group in Workshop 7. The group validated the learning outcomes through a discursive group process. The fact that students’ sustainability learning (albeit declarative knowledge) was independently evaluated as having increased, indicates learning outcome validity.

However, later in the project, with the implementation of the assessment rubrics, group members saw that they had changed their curriculum by embedding sustainability holistically into assessment and therefore in the discipline and the program, as discussed in relation to Cycle 3 (see section 5.3.2).

Enactment of the new curriculum: Group members were observed teaching the new curriculum in all cases of curriculum change, as discussed in relation to Cycle 2.

5.6.4 Results

Results refers to the degree targeted outcomes occur as a result of learning event(s) and subsequent reinforcement. In this case results refers to:

- students' learning;
- group members' capacity and confidence to bring about sustainability-related curriculum change (including transformative learning);
- local policy and practice;
- institutional culture.

Student learning. That students achieved sustainability learning as a result of the curriculum change was evidenced in a number of ways. The most compelling demonstrations of this were from: (1) the results of the student surveys, and (2) the results of the independent evaluation of student assessment.

The student surveys show students' knowledge of sustainability and sustainable practice increased in the form of declarative knowledge (see Appendix E and Appendix F).

The evaluation of student work revealed that students had applied the learning associated with the course (see Appendix I). This indicates students developed their understandings of sustainability in relation to TD practice through enhanced functioning knowledge (Walsh, 2007).

From these two forms of data, it would seem that the project achieved the goal of sustainability-related curriculum change, in that students have increased their sustainability knowledge and ability to apply this. This finding validates the notion that students learnt about sustainability and therefore indicates successful curriculum change.

Group members' capacity to bring about sustainability-related curriculum change (including transformative learning): This aspect of sustainability learning refers to building competence and motivation to engage in change; in this case, for the group members involved in the project. Overall, group members become more empowered to change during the course of the project by engaging with colleagues in critique. In the past they were largely limited to the curriculum domain of their individual courses, or possibly to the subdiscipline in which their course is a part (e.g., CATD or Textile Studio).

Transformative learning is a dynamic process. It is not always possible to identify the start of this process, nor a causal relationship between transformative learning and the planned

learning experience. Furthermore, transformative learning does not always rely on the experience of dissonance, when some participants might experience transformative learning, while others may not (Kasworm & Bowles, 2012). As indicated in earlier chapters, a number of group members in the project had started considering sustainability learning in relation to their teaching prior to commencement of the project. Moreover, the program was already imbued with a degree of sustainability and sustainability learning understanding and experience, even if this was not extensive nor readily expressed. During the project the group felt after a time that the term *sustainability* was becoming problematic, especially when in discussion with their students. The following extract shows the group discursively seeking an alternative term for sustainability that embodies the concept of sustainability in TD practice. This discussion shows how the group worked collaboratively exploring and engaging in meaning making. In this scenario, they take the concept of sustainability into their discipline, demonstrating how while at first they lacked confidence in teaching sustainability, later they own and promote it within their professional identities.

In the middle of the project, mid-2010, the group were starting to see sustainability as entirely embedded within TD practice, as indicated in the following extract:

Extract from transcript Workshop 6:

AA: ... [We] need to think about the words that are synonymous with how we have been talking about sustainability. Good design might be one of them.

AE: Rather than just straight sustainability.

Facilitator: ... what is the term that is going to resonate with all year levels at this stage?

AG: I was thinking "ethical" or something that is responsible

AE: Or "responsible design"?

AC: Responsibility, responsibly designed?

Facilitator: Responsible design... Oh, that is good.

AE: Something along those lines.

AG: It is a personal responsibility.

AC: Considered?

AE: Yes, considered.

AC: Responsible practice....

AF: ... That is, the use of resources and how they all work together within the workshop and all that sort of thing. I guess that is what they are maybe going to hit on. Then maybe in Textile Studio they are going to think of it more towards ethical practice or something.

Facilitator: If that is your natural language, if you are using a consistent term like that, that would be helpful too for the students because then they see you sharing.

AE: [We need] terminology we are reinforcing across [the program].

AF: I guess that is what we need to work out some sort of language we are using consistently.

Facilitator: But I like responsible design [because] you have been thinking about this for over a year and you all came up with that really quickly, so it is obviously something that resonates.

Extract from transcript of Workshop 7:

AC: And it's all so, because we're having these bigger conversations about program renewal and research and all of that stuff coming up, it is like, how is what we have been doing with this curriculum change, informing what we're doing about research. What is it doing in terms of how the program you are shaping? The bigger, longer conversations we are having about what it means to be a designer and all that sort of stuff is having an impact.

Facilitator: Oh, okay.

AC: And the sustainability curriculum is being, you know, the starting point so that.

It is not realistic to expect all participants to experience transformative learning and change as a result of a given learning event, or to experience transformative learning in the same ways (Kasworm & Bowles, 2012). However, powerful evidence of group members' engagement in long-lasting, transformative learning and change comes from the journal article "Three Academics' Narratives in Transforming Curriculum for Education for Sustainable Development" (Wahr et al., 2013), co-written by three of the participants and myself, which reports on the transformative experiences arising from the project. The article demonstrates the scaffolded development of the professional reflective practitioner as different members of the group change to become more self-directed and confident in their sustainability teaching. A further example is the assessment leaders' initiative and work arising from their engagement in the project, empowering them to lead change, as described in section 5.3, referring to Cycle 3.

Further, each group member reported significant aspects of professional change at the end of the project. The end of project survey asked group members to anonymously respond to the statement: “Thinking about the project overall, what are the three most useful things you have learnt from your involvement in the project?” The responses from all seven group members suggest that a number of aspects of the project were useful to them. The following is a selection of their responses. (Note: as the surveys were anonymous, they were coded as Respondent 1 = R1, and so on.)

Learning and Teaching development:

- R2: “Planning teaching content and assessment using ILOs.”
- R2: “Introducing new teaching approaches and more student-centred learning activities to reflect sustainable practice and processes.”
- R3: “Learning and teaching theory and practice.”

Learning and teaching theory and practice development as an enabler for curriculum change:

- R4: “Developed my L&T theory and language, and experienced how useful this was to enrich, support and make sense of the way sustainability could be integrated into my courses/projects.”

Sustainability and sustainability learning understandings:

- R4: “Expanded research and practical knowledge related to sustainability that now covers the three strands – social, economic & environmental.”
- R5: “Understanding the complexity of sustainability learning.”
- R6: “Holistic view of sustainability within the program.”

Team learning and collaboration:

- R1: “To value the knowledge of your team members.”
- R4: “Successful collaboration result – between facilitator and the program but also between staff.”
- R7: “It has reminded and reinforced to me the importance of teamwork.”

Textile Design practice:

- R5: “Deeper understanding of the holistic view and approach to TD practice.”

Reflective practice:

- R6: “Personal introspection and the need for ongoing self-evaluation.”

Sustainability teaching capability: During the project, group members' sustainability teaching capability was enhanced in a number of ways. Informed by an enhanced learning and teaching knowledge and skills base, group members developed and applied their learning and teaching approaches in systematic and strategic ways. Akin to the learning and teaching action research projects described by Kember (2002), the project supported group members to develop their learning and teaching capability, enabling and empowering them to improve their teaching practice. As found by Cowan, George, and Pinheiro-Torres (2004), such learning and teaching empowerment has implications beyond the group members teaching into the program, as their new capability allows them to identify their own learning and teaching goals and use evidence-based approaches to achieve these, increasing the academic development capacity of the university overall.

The curriculum change included an overhaul of assessment procedures in a majority of courses to include specific aspects of sustainability learning. This reinforces that academics valued sustainability learning as part of their teaching and as appropriate to their disciplines (Radloff et al., 2008).

The continually evolving nature of curriculum improvement is a significant outcome of the project. In the article describing the reflective practice and transformative learning experience of three of the academics involved in the project (Wahr et al., 2013), academics refer to themselves as being able to extend their curriculum development work beyond the project with additional cycles of action research, see Appendix O. As Willcoxson, Wynder, and Laing (2010) describe in their project to embed and evaluate graduate attributes in an undergraduate accounting degree, the process of mapping, developing and aligning learning outcomes and learning activities "... builds the longer-term capacity of accounting staff to maintain the relevance and coherence of their program in a systematic process" (p. 65).

Local policy and practice: A further lasting outcome arising from the project is the collaborative approach to the learning and teaching work. Group members refer to themselves as being able to extend their curriculum development work beyond the project with additional cycles of action research. The capacity to do this is attributed to having been involved in the project.

Facilitator: ... what's the benefit of evaluating [the curriculum change] for you?

AE: Well it helps me review my teaching.

AC: Yes.

Facilitator: So it's teaching improvement?

Others in the group: Yes

AC: And it's all so, because we're having these bigger conversations about program renewal and research and all of that stuff coming up, it is like, how is what we have been doing with this curriculum change informing what we're doing about research? What is it doing in terms of how the program you're shaping, the bigger, longer conversations we are having about what it means to be a designer and all that sort of stuff is having an impact?... And the sustainability curriculum is being, you know, the starting point for that. (Evaluation workshop, July 2010)

Prior to commencing the project, group members reported they did not have control over the formal aspects of curriculum design of the program or their courses. They indicated they had autonomy to interpret the course guides and to develop appropriate learning experiences for students; however, they had not been involved in shaping those course guides. This project gave group members the opportunity and experience to contribute to and influence curriculum change in relation to sustainability. They collaboratively identified appropriate sustainability learning across the program as a whole, which then through negotiation was integrated into courses. This integrated or holistic view of sustainability in the curriculum represents an important shift for group members. As Reid and Petocz (2006, p. 114–115) argue: “where sustainability in all its guises is an essential component of teaching; teaching is seen as encouraging the students to make a personal commitment to the area represented by course content, including sustainability as part of that”. It can be argued, therefore, that a new norm was created through the process of collaborative curriculum change, which has the capacity to extend beyond the project to future curriculum change efforts (Wahr et al., 2013). It is possible to surmise that this shift towards collaborative continuous improvement has created a normalised, positive reinforcing cyclic development of improving group members' confidence and commitment, based on growing trust, sharing and assistance among the group (Fullan, 2001).

Institutional culture: It cannot be assumed that the outcomes of any action research will extend to those external to the project (Kember, 2002). Nonetheless, there is scope for dissemination of outcomes using appropriate models. In this case, the project contributed to sustainability more widely, by being recognised as a successful case of curriculum change within RMIT. RMIT's sustainability learning and teaching guidelines and resources (RMIT University, 2013a), first published in 2013, include references to and a template developed

within this project, and included a collaborative publication to assist others with sustainability-related curriculum change (Underwood et al., 2011). However, apart from raising the profile of sustainability curriculum in general terms through publication of research papers and winning awards, the impact of the project at institutional level would have to be seen as minimal.

In relation to the School of Fashion and Textiles, the project received attention through information sharing and collaboration on small initiatives involving those outside of the group. However, direct changes would be hard to attribute to the project. The HOS introduced a whole-of-school committee, which he chaired and which considered the sustainability practices of the school, especially in relation to campus management and technical processes. This committee operated for the entire duration of the project and beyond. The HOS always attributed the impetus for the school sustainability committee to the project, as a response to calls from the group to need to be seen to “walk the talk”.

5.6.5 Internal validation

As discussed in Chapter 3, action research is evaluated in two ways: contributions to change in practice and theory locally and more broadly, as well as through internal validation. Internal validation focusses on the group practice and experience during the project (Burns, 2000). That all group members agreed to and subsequently undertook the curriculum changes demonstrates internal validity: “[a] validated curriculum is one in which the planned, enacted and experienced curricula are aligned in the eyes of relevant stakeholders, including students” (Bath et al., 2004, p. 325).

Internal validation, however, also includes more subtle aspects than the measureable evaluation data in the above sections. To describe these aspects of the project requires accounts that include glimpses of the relationships, the one-to-one interactions, the building of trust and commitment. These are the aspects of the project referred to by Mnguni and Long as the “in-between spaces” (2006, p. 73). These accounts arise from ongoing close interaction between myself as facilitator and group members over an extended period, using an inductive approach (Liddell, 2002; Thomas, 2006), an integral aspect of the embedded model. Given the intent of the program to bring about transformative learning, internal validation is indicated by the inquiry culture developed within the project (Mattsson & Kemmis, 2007).

That the group sensed their own development and change in practice and understandings and the significance of the change to their work and the broader context generally (Kemmis &

McTaggart, 2008, p. 277) is discussed above. The published articles, presentations, resource sharing and informal discussions associated with the project is a testament to this inquiry culture as these aspects were, like the project as a whole, entirely optional.

Nonetheless, various group members enthusiastically participated in many of these activities. Further, the second co-authored published article indicates satisfaction through the group’s growing shared understandings and collaborative initiatives arising from the project. Figure 5.18, drawn by a group member, shows before and after impressions of stakeholders’ understandings of sustainability and engagement in a group process as a result of the project, provides an illustration of this. This illustration appeared in the collaborative paper, “A group approach to embedding sustainability within a degree curriculum: Collaborative, creative, iterative” (Underwood et al., 2011, p. 67). Note that the blue people represent the group members and green, the students.

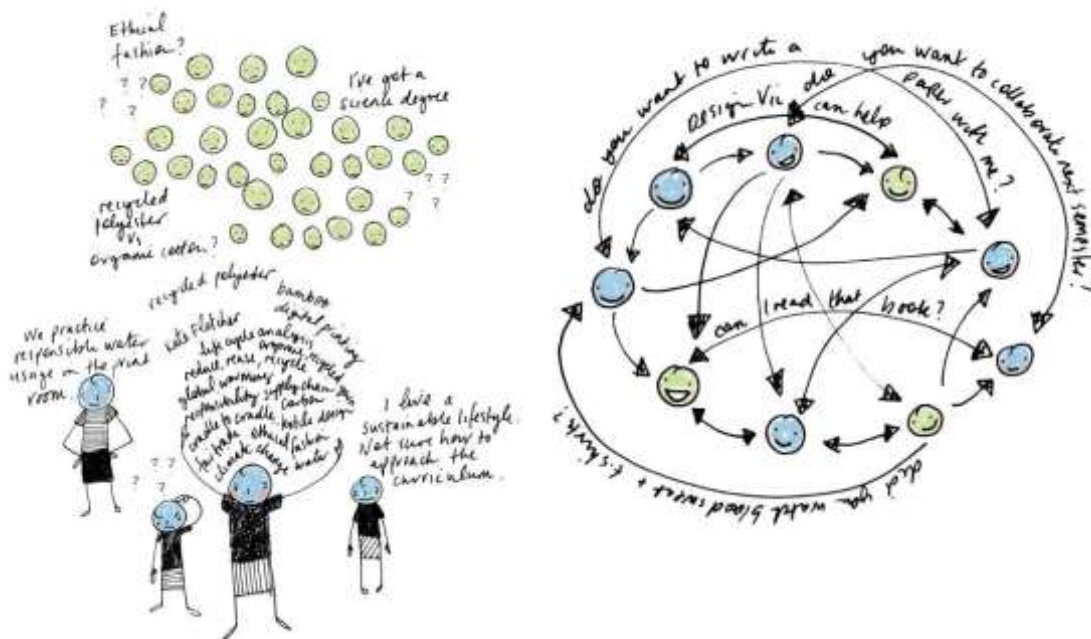


Figure 5.18: Illustration depicting the meaning making process arising from the project.

Note: © Emma Lynas, 2010. Reproduced with permission.

5.7 Chapter Conclusions

This chapter presented the action research cycles of the project and an evaluation of the professional learning associated with the curriculum change process.

This chapter has described the goals, activities and outcomes of each action research cycle and evaluated the professional learning arising from the curriculum change process. It located

the project within an authentic context of university curriculum change: a dynamic and multifaceted reality where a program team undertakes a demanding change project alongside teaching classes, conducting research, undertaking the administrative requirements of their work and maintaining their professional practice and networks. This context provided the backdrop for the story of the project, and the chapter has sought to capture and describe, among other elements, the atmosphere, the tensions, the camaraderie, and the busyness of the day-to-day lives of TD academics and myself as we worked together.

The evaluation considered both the outcomes of the professional learning, using an contextualised version of Kirkpatrick and Kirkpatrick's (2006) professional learning model, as well as the internal validity of the project. The evaluation demonstrates the project resulted in meaningful professional learning for group members, supporting them to bring about sustainability-related curriculum change. This suggests the potential for lasting and transformative learning resulting from the project, including for students. A key finding of this study, therefore, is that the application of the embedded model in the context of the TD Program was successful. The next chapter will consider the role of the embedded model itself in contributing to this success.

Chapter 6: Discussion

6.1 Introduction

The previous chapter presented the action research cycles of the project and an evaluation of the professional learning associated with the curriculum change process, based on the embedded model.

This chapter considers the significance of the embedded model to the outcomes of the project and the overall project success. The embedded model itself arose from the study and was informed by the literature relating to sustainability learning and academic development and my professional experience, as well as reflection on the practice of the project itself.

6.2 Relating the Project Success to the Embedded Model

As discussed in Chapter 3 the embedded model has the following key features.

Embedded model

Intent:

- deep and transformative change for academics;
- long-lasting impact of outcomes and benefits.

Process:

- professional learning approach is based on the need for critical reflection;
- scholarly approach adopted;
- discipline perspective emphasised:
 - whole-of-program focus to curriculum change;
 - all of the program team involved;
 - participants encouraged to approach the work from within their existing discipline/professional lenses;
 - existing sustainability capacity within the program team and program recognised, celebrated and capitalised on rather than applying a deficit model of starting from scratch;
 - engagement with a range of stakeholders within the university and industry and the program/discipline perspective promoted.
- social learning within and beyond the group promoted:
 - group workshops and activities the focus of professional learning;
 - multiple perspectives explored;

- collaborative problem solving enacted;
- action orientation applied;
- reflection on action fostered.
- facilitation of the project provided:
 - facilitation and support provided within the professional practice context of the program team and the local teaching context;
 - facilitation is anticipatory of and responsive to professional learning needs of the program team;
- project undertaken over an extended time period;
- curriculum design underpinned by constructive alignment;
- sustainability learning taught, assessed and reviewed.

Outcomes:

- project ownership and engagement in the project among academics established;
- sustainability issues viewed as relevant within local and broader contexts;
- sustainability learning built into and aligned within the curriculum;
- links to other sustainability-related initiatives built;
- academics integrate sustainability into their learning and teaching work and their research;
- cohesion strengthened within the group;
- reflective practice and self-awareness among participants enhanced.

While the overall success of the project can be attributed to the embedded model, a number of factors attributable to the model were particularly significant. These factors arose from the combination of elements found in the embedded model. These factors have been identified after reviewing and sifting the project data multiple times using a general inductive approach (Thomas, 2006). By way of summary, these key success factors are:

1. normalisation of critical reflection within the project;
2. development of a common language within the group;
3. maintaining group motivation;
4. responsive facilitation.

6.2.1 Key success factor 1: Normalisation of critical reflection

This study is predicated on the need to support transformative learning. Ongoing or normalisation of critical reflection was important to the process because the main premise was to do things differently, and this relied on the group working with and on deeply held perspectives and attitudes. As discussed in Chapter 2, change in practice to include

sustainability learning requires a paradigmatic shift in how group members understand their discipline and their teaching practice in relation to sustainability. While the group were interested in including sustainability more systematically in the program, it was not clear to them at the outset how this could be achieved. This uncertainty is illustrated by the following extract.

Extract from AC – initial interview:

We've already been having conversations as a group of staff about how can we really integrate sustainability better across the whole program, not just individual courses just touching on it, but how can we build that knowledge. ... I have touched on sustainability [with my third year students], but it's quite obvious that they haven't really grasped the core concept... The problem for me is that I don't know much [about teaching sustainability] myself ...

The SWOT analysis conducted at the commencement of the project identified a number of limitations and challenges associated with the project (see Figure 6.1). These showed group members held a range of deeply held perspectives about themselves as teachers, about sustainability, about their students and the program, and about how to undertake curriculum change. These perspectives were entirely reasonable, and moreover, showed group members were highly capable of critical self-reflection on and insight into their practice. By the end of the project, the group members had shifted their thinking on a number of their core beliefs. This is demonstrated in the collaborative paper, "Three Academics' Narratives in Transforming Curriculum for Education for Sustainable Development" (Wahr et al., 2013). Moreover, by the end of the project, the group members recognised the need for shifts in thinking in order to achieve successful curriculum change: "Our reflections have led us to re-examine our assumptions and practices and resulted in transformative shifts in thinking and practice over the course of the project to enhance our ESD teaching practice" (Wahr et al., 2013, p. 111). How was this shift achieved? I now focus on five aspects that exemplify how the project normalised critical reflection.



Figure 6.1: Limitations and challenges identified in the SWOT analysis.

First, support for and evidence of genuine transformation is provided through the action research cycles. Each of the three main cycles of the curriculum change project encouraged the group to work on a key aspect of curriculum change. The critical approach used in the professional learning had the concurrent effect of challenging existing ideas around these aspects in terms of sustainability, discipline and/or teaching. In turn, the group responded by acting in ways that supported the curriculum change; that is, group members engaged in transformation.

This is demonstrated in each cycle. Cycle 1 considered the significance of sustainability learning in the TD discipline and program. To progress the curriculum change, group members identified and committed to, albeit in broad-brush terms, changes they would make in their courses individually and to the program collectively. In reaching this point, they had collectively determined sustainability had a place in the program, but they also had decided for themselves there was a place for sustainability in the course/s they had committed to change and teach. They were, in fact, reconceptualising the discipline for themselves.

Cycle 2 focussed on group members developing the specifics of the sustainability learning in their courses and learning approaches that would support that learning for students. This involved reconceptualising themselves as teachers of sustainability learning. Cycle 3, by focussing on enhancing assessment of sustainability learning, asked them to review their assessment practices in general. This was especially challenging as it asked group members to test the validity of their teaching approaches generally and the assumptions inherent within these. This involved reconceptualising themselves as teachers.

The work of Cycle 3 also required group members to examine their own sustainability knowledge and practice. In reviewing the assessment approaches in Cycle 3, group members

were provided with an approach to assist them to clarify the detail of the sustainability learning their courses expected of students and then to compare this with the ILO. This data came from unpacking the learning inherent in each assessment task by making the grading standards specific and explicit. Consequently, Cycle 3 resulted in group members asking themselves if they had the sustainability skills and knowledge to support students to achieve the required learning outcomes.

As these examples from the three cycles demonstrate, creating space for reflection normalises critical reflection. The process encouraged the group to take responsibility for problem solving and making key curriculum decisions. To facilitate this, and consistent with good practice, opportunities were created for exploring the multiple understandings and interpretations that can arise in group discussion, thereby encouraging critical reflection.

Second, critical reflection was normalised within the project through the collaborative reporting and scholarly work, which included writing academic papers, applying for awards, and writing reports for other stakeholders, including school committees and peers. This is consistent with existing scholarship, which has found that participant-based scholarship of learning and teaching research is most likely to support reflection (Reid & Petocz, 2003).

Third, facilitated workshops, while designed to achieve particular curriculum goals, were also intended to support group reflection and discussion. Reflection became the norm within this context with the regular questioning of existing practices and imagining potential future practice. For instance, the mapping workshop came about after each academic had nominated the type of sustainability learning outcome/s their course would address and the sort of learning activities and assessment that would be used to achieve this. During the workshop, the sustainability learning associated with each course was discussed by the group and related to every other course. Each course's learning outcomes were negotiated and confirmed as appropriate relative to the other learning in the program curriculum. This was done both horizontally and vertically to scaffold student learning; that is, relating learning in subdisciplines across years (say Textile Design courses in years 1, 2 and 3) and across courses of a given year level. The focus of the workshops was on pinpointing the appropriate learning outcomes of the program. The group used the SOLO taxonomy as a guide to name, clarify and critique the understanding levels inherent in the sustainability learning they were expecting. Only then were group members able to compare and contrast the expected learning in their courses to other courses. The following transcript extract provides an example of this type of collaborative critical reflection in relation to the Textile Design courses:

Extract from transcript of Workshop 4:

Facilitator: So, can I just ask another question? If it is Textile Design and it is actually in the doing, [students'] main assessment will be what they have produced?

AA: ...Well Textile Design is more about application isn't it? We've talked about it.

AF: I don't know those crosses [on the template] are in the right spot for the first year, do you think?

AB: It shifts, I think in first year it is about core acquisition of skills.... Textile Design should "apply".

Facilitator: ... well wouldn't it be simple application of principles?

AF: Could it be "this is how you use the print room resources"?

AB: Yes, water management.

AF: Is that "apply" or is that "explain"?

AB: ... applying it is asking them to not waste resources....The question is "Are they being assessed on that?"

Fourth, the evidence-based approach taken in the project also supported normalisation of critical reflection. The following extract is from a discussion during a workshop where the group reviewed the student survey results collected over three time periods, demonstrating if and how student thinking had changed over the course of the implementation of the new curriculum. At this point in the discussion, the group referred to survey questions asking students about their confidence to practice sustainably professionally, in small-scale and large-scale production settings.

Extract from transcript of Workshop 9:

AA: But the confidence levels of the third years [students] have gone down.

Facilitator: Yes, what do you think of that?

AA: [Students] Knowing more.

AB: More self-doubt.

AC: Yes, knowing more.

AA: Or being overwhelmed by it.

AD: Or even it becomes more complicated.

AA: Yes it is not as easy.... easy to do something.

AD: Where you are just concerned with your own little bit in your backyard you can manage it, but then it becomes bigger and overwhelming.

AC: And I think it is interesting to look at the idea of professional practice there because it is becoming more about how you, in your role as a textile designer, can have an impact, can affect, can do something.

AD: Yeah, and in third year they are exposed to things, I guess the real world, so they are working with industry and they looking at the supply chain.

AA: Yes, some of the realities.

AD: And all of the many people involved in textile related product, and they [students] are just one tiny link in the chain.

This discussion shows how the availability of data prompts the group reflective process. First, having the student survey data allows group members to identify an issue. Second, the discussion indicates that group members attribute different possible explanations for the issue, thus sharing and exposing others to different perspectives. The group members empathise with students' experience, suggesting they are relating the students' experiences to their own challenges with sustainability and sustainability teaching arising from the project. Group members were interested in and prepared to problem solve the issue, in turn leading to action that creates further opportunities for reflection.

Fifth, trialling approaches over an extended period supported and provided opportunities for critical reflection. It is natural to think that, faced with a set of unfamiliar learning outcomes, group members might be daunted by the task of teaching them. As demonstrated, group members needed time to play with the ideas of sustainability and make sense of what the concepts mean for their discipline and their teaching, leading to ownership of the concepts. Group members started the process with vague ideas of sustainability and what it meant for them, subsequently leading to the formation of firmer concepts of teaching sustainability, which led to greater sustainability fluency, confidence and expertise, and ultimately supported group members' shift in the complexity of their understandings of sustainability over the course of the project.

A significant aspect that normalised critical reflection was the project's emphasis on action that provided an experiential basis for reflection. The project followed standard stages of curriculum design: that is, determination of the ILOs, developing appropriate learning activities, and ensuring that assessment is aligned to the learning outcomes and the learning activities. Each cycle of the project essentially represented one of these stages. Each stage

had a naturally occurring action attached to it. The curriculum change process provided a structure of interdependent steps. The action research approach provided the emphasis on critique by establishing a reflective environment and undertaking action, and therefore by having something to reflect upon. These actions included deciding on learning outcomes for each course, trialling new teaching and assessing student work. These experiences provided rich material for content, process and premise reflection, as indicated in the above extracts.

The quality of reflection is essential to the forms of outcome achieved from the project. The challenge has been to create a learning environment that promotes reflection rather than limiting reflection. This was supported by developing a common language for critical reflection.

6.2.2 Key success factor 2: Development of a common language within the group

Over the course of the project, the group, including the facilitator, developed a common language to examine and develop practice. The resulting common language was made up of a range of literacies and forms of knowledge, including theories and practices of learning and teaching, sustainability and TD. The common language also included group-generated, locally contextualised forms of language and knowledge.

A common language within the group supported criticality. Griffiths and Tan (1992) claim that to truly critically reflect and change we must identify and question our personal theories and then relate these to more public theories. The public theories in this study have focussed on sustainability learning as related to TD, but through the lens of group members' general teaching practice. Working through learning and teaching theories provided a mechanism to question existing teaching practices and consider alternatives. The project assisted this by allowing personal teaching theories to become explicit.

In the first instance, learning and teaching became the language of engagement in the project as it was something all were involved in (Morris & Fry, 2006). The learning and teaching discussions became a way of revealing ideas about teaching. These discussions in relation to sustainability and TD provided a fully integrated shared language. This common language provided the group with a voice to examine practice, support meaning making and test ideas.

Feedback from the final survey of group members shows group members came to value the development of the learning and teaching language. Six out of seven group members included gaining or improving their knowledge and understanding of learning and teaching as at least one of the three most useful things they learnt from being involved in the project (see

Appendix D). This was attributed to, or at least associated with, a cultural shift within the program:

Extract from transcript of Workshop 9:

AA: And I think also it was 2009 when we started, its only 2011 now and it is that cultural shift probably within the program in the language we use amongst ourselves that probably takes time for that to filter through to the student cohort as well.

As indicated by the above quotation, the common language had taken time and effort to develop. For instance, early in the project, as facilitator, I provided learning and teaching materials based on constructive alignment as a way of framing the curriculum change. There was initially a mixed response to this approach. The comment below by one group member suggests a strong willingness to engage with learning and teaching theory and practice and to use it to improve existing practice. At the same time, another group member was concerned the introduction of a learning and teaching framework could make the project overwhelming.

Extract from transcript of Workshop 2:

AD: I had read through the [learning and teaching related] links that you provided the other day and I think we do a bit of that anyway. But it is nice to actually know there is a language for it and to be able to read up on it, but I think that maybe what we could do today is just talk about how we assess if we are going to go down that road of using those rubrics that are attached to the ILOs and LAs [learning activities], then we need to have a better [learning and teaching] system.

Extract from transcript of Workshop 2:

AA: Well I think the culture within the group is that ... Doing it [working on learning and teaching] in a group kind of environment means that we need to perhaps re-shift the way we think about our subjects in order to accommodate the methods that each one of us has developed individually. And that to me seems like a big task.

The common language shifted throughout the project, reflecting the changing personal and public theories of the group (Griffiths & Tann, 1992). The following example, in relation to sustainability learning, demonstrates this shift also. During the project pre-step, group members referred to the extent and form of the sustainability learning envisaged necessary for students. For some group members, sustainability learning was seen as a core concept that defined the TD discipline, while others saw students as needing to only have an awareness of sustainability. This range of understandings of how sustainability learning fitted into the

program might suggest a different vision for the sustainability curriculum among group members. However, these differences might also demonstrate differences in language usage at the time. Either way, over the course of the project, the group clearly came to refer to sustainability learning as included in the design principles of TD.

Further, the group saw their language around sustainability as constantly evolving. For instance, during Workshop 1, the “towards a sustainability definition” activity encouraged each academic to reflect on their own understandings of sustainability by writing 10 words or terms on sticky notes. They then shared and grouped words and terms and discussed the significance of the groupings and the commonality or variation among the words/terms. This activity is demonstrated in Figure 6.2. In further group reflection, the groupings were seen as aligning with the sustainability pillars that provided a form of initial affirmation for the group, as shown earlier in Chapter 5, Figure 5.4. The following extract demonstrates how the group recognised that their working definition of sustainability would necessarily change over time, as their understandings became more informed and sophisticated.

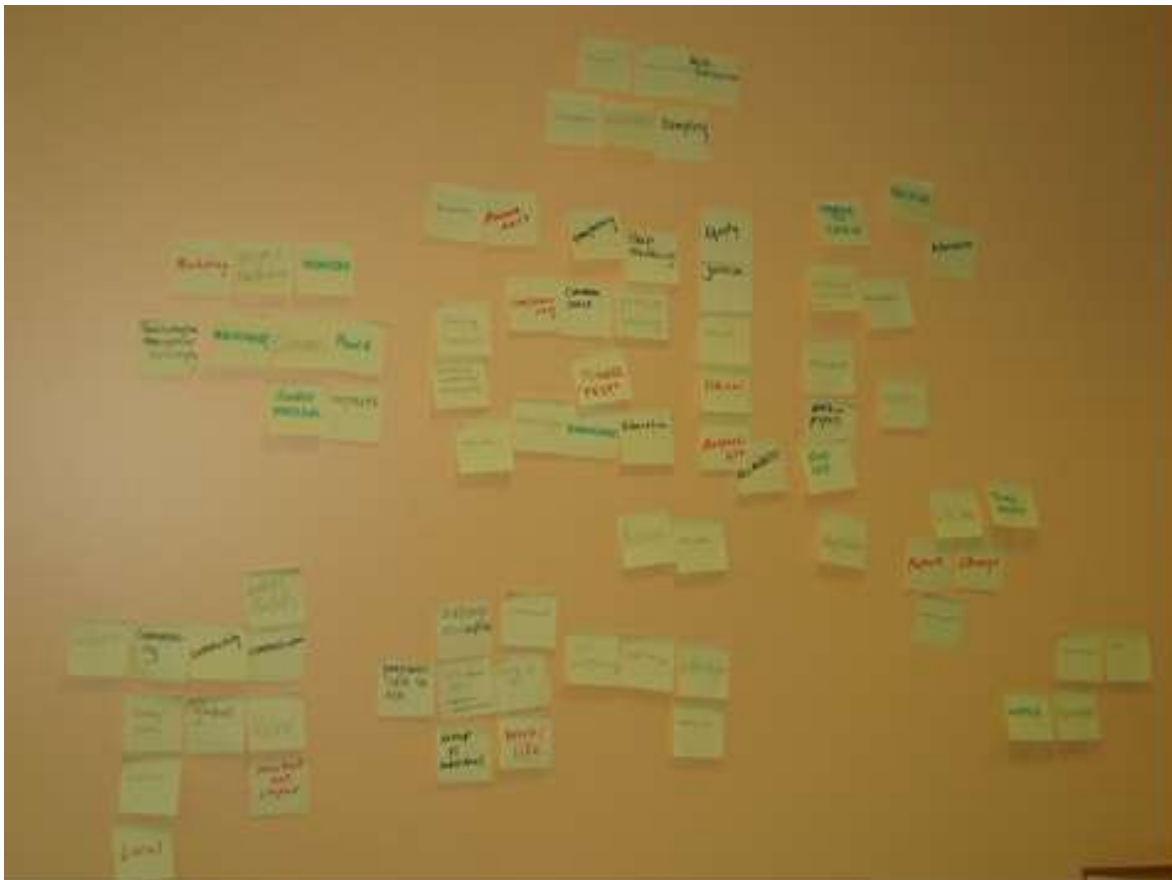


Figure 6.2: Photo of group’s shared ideas about sustainability.

Extract from transcript of Workshop 2:

AC: When I was writing the definition I was very focussed on it being something that wasn't necessarily just keywords. But it was about the practice of good design and that is fundamentally what we are about and that brings in aspects of sustainability as a given.

AA: Do you think that the idea of an overall definition might be something that is a bit plastic at this stage? Maybe all of these things need to go in a kind of circular fashion.

AC: That we keep developing.

AA: That we consult our courses and bear in mind these thinking groups that we've come up with [referring to the "towards a definition" activity]. And we might say "okay actually we need to alter this" and like that it becomes much more of an organic process.

Another example of the shift in understandings of sustainability among the group becoming more locally contextualised within TD is provided by the following example. In this case, the group led and directed the change process to address a need they had identified. The term "sustainability" was referred to locally by the group as "the S word" for a time. This originated with students, and referred to both what they saw as over-use of the term "sustainability" in their classes, as well as a difficult concept involving challenging work for students. The group responded by seeing a need to reflect sustainability more accurately in their teaching; that is, sustainability should be integrated rather than be treated as an add-on. By contextualising sustainability learning more deeply within the discipline it was more likely to be meaningful for students. The transcript extract illustrating this was presented earlier in Chapter 5, section 5.6.4. The group collaboratively and respectfully debated and critiqued their use of key terminology, enabled by their existing shared language. Through this they collaboratively came up with more meaningful terms – "responsible practice" and "responsible design"; firmly locating sustainability learning within their discipline. Here then, was another example of critical reflection leading to meaning making and deeper understandings, achieved through reflecting on practice. In addition, the group recognised that these terms would necessarily continue to evolve, due to their ongoing reflective practice.

Towards the end of the project, group members were writing assessment rubrics that demonstrated how the common language had come together to support a powerful approach to sustainability learning. A strong example of this is the first-year assessment, assessment standards and rubric criteria developed by two members of the group, the assessment leaders. This located sustainability firmly as core to the curriculum and, in particular, as associated

with the outcomes of the TD process. Other examples can be found in the reflection of group members in the paper “Three Academics’ Narratives in Transforming Curriculum for Education for Sustainable Development” (Wahr et al., 2013). Figure 6.3 shows a figure from the article that summarises the process one academic engaged in to embed sustainability into her course during the project. This demonstrates the extent to which over the years 2010, 2011 and 2012, sustainability learning shifts from an add-on to an embedded approach through the use of enhanced assessment techniques. The common language provides the basis to express the shift in a scholarly way.

Prior to 2010:
- Sustainability present, but narrowly defined.
- Students could chose to undertake a sustainable design project.
- No specific learning outcome or assessment criteria relating to sustainability.
- 2009 - Curriculum change project commenced with program mapping and planning.

2010 (1st cycle of the project continued):
Action - Place sustainability assessment task (written statement) within the design project and assess the task.
Reflection - Students more aware, but the task is an add-on. Task is aligned to assessment, but how much am I assessing (sustainability vs. writing skills)?

2011 (2nd cycle of the project):
Action - Place sustainability as a key learning outcome. Align learning outcome to assessment. Define sustainability within the assessment criteria.
Reflection - Sustainability is not an add-on, but embedded. However assessment seems superficial, definition is too simple. What exactly do I mean by sustainability?

2012 (start of the 3rd cycle of the project):
Action - Define in detail the dimensions of sustainability within the assessment rubric.
Early reflections - Sustainability is embedded. The learning outcomes and assessment are now closely aligned. Student outcomes appear stronger.

Figure 6.3: One academic’s reflection on embedding sustainability into their course.

Based on these transitions in understanding and language, Figure 6.4 is a representation of the arguably symbiotic relationship between learning and teaching and sustainability learning. The arrows represent an individual’s learning journey, where each person notionally starts

with differing knowledge and skills in the two knowledge domains. The professional learning process engages with and transfers one knowledge domain through the other, building the overall competence in sustainability learning and teaching in TD. It is noted that this image is an adaption of the visual representation accompanying the text from the same published article (Wahr et al., 2013).

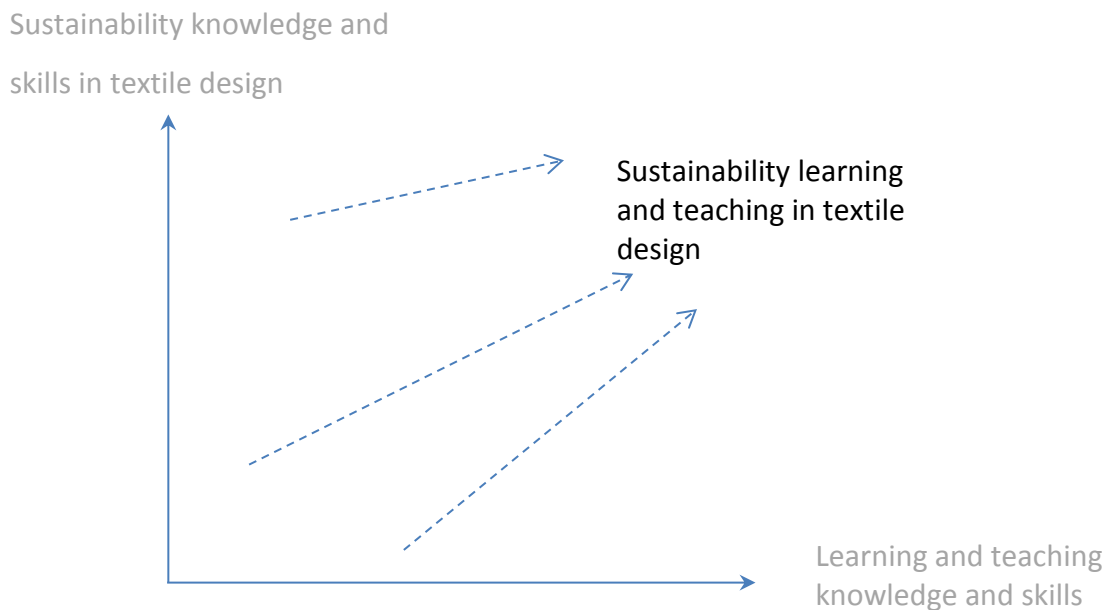


Figure 6.4: Representation of the relationship between discourse development and sustainability related curriculum change.

By way of summary, therefore, the development of a shared language can be attributed to the embedded model in three key ways. First, taking a discipline approach supports the development of a shared language as the group was able to reflect on their learning and teaching through the existing shared language of their discipline.

Second, the contribution of the facilitator also supports the development of a shared language (note, facilitation is discussed further in section 6.2.4). In this project, the facilitator could only ever share expertise in the area of learning and teaching and supporting curriculum design. Coming from a different discipline (higher education) brought a language able to describe learning theories as well as methods to evidence and critique current approaches and change, and also the time and energy to collect the data. The facilitator provided learning and teaching professional learning at points in the project when it was judged helpful to do so to progress the curriculum change; that is “just-in-time” professional learning. The group had TD expertise, and only they could make sense of how sustainability could be integrated

within that knowledge or discipline in order to be framed appropriately to be taught to students. No domain of knowledge was privileged over another. It seems that the group were able to respect each other's expertise as valuable to the project.

Third, conflicting understandings and purposes of curriculum change can arise between management and academics (or top down and bottom up) when there is no normal capacity to negotiate by communicating and working together (Lines, 2005). This can significantly undermine project agency and ownership, and outcomes for those involved in change (Lines, 2005). In this project, such conflict between stakeholders was avoided; no single domain dominated. When leadership tensions arose within the project, it was reviewed, renegotiated and reoriented within the bounds of existing working relationships and group discourse, supporting group engagement and keeping the project on track.

6.2.3 Key success factor 3: Maintaining group cohesion in relation to the project

The third factor that can be attributed to the project's success was maintenance of group cohesion over the course of project; the extent to which group members are attracted to the group and its goals. Cohesion can consist of "feelings of interpersonal liking, task commitment, and group pride" (Paulus, Kohn, & Dzindolet, 2011, p. 449). Luedekke (1999) places relations between group members – that is, shared values, mutual respect and care among participants – as more important to supporting participant commitment than to particular project goals. This suggests that if there is conflict between these aspects for members of a given group, they are more likely be motivated by their commitment to their colleagues before a given project's goals. Therefore, if the project in this study conflicted with the group members values, became disrespectful or uncaring in the eyes of group members, they would be inclined to become disengaged and withdraw from the project, or not get involved in the first place.

As described in Chapter 4, the academics teaching into the TD program were an existing cohesive group, based on their shared affiliations to the TD discipline, profession, and industry as well as their work at RMIT, including their teaching in the program and their commitment to students. The TD academics also had strong mutual regard for each other, they got along well, as well as having personal and professional commitments to more sustainable practice. In as much as the TD academics were motivated to work with the facilitator and become "the group" to embed sustainability learning into their curriculum, there was cohesion within the group to undertake the project.

Maintaining cohesion within the group was essential to supporting the perseverance of members and their motivation for achieving the goals of the project in the longer term. As the overall goal of the project was to embed sustainability learning in the TD curriculum using a whole-of-program approach, it required all group members to stay engaged with the project. It is conceivable, however, that the cohesion of the project group could decline at some point. Notionally, this would suggest the commitment of the project group members to the project goals had dropped off in some way, or that interpersonal issues had arisen. One or more members of the TD team might, therefore, choose to withdraw from the project group at some point during the project. If this was to occur, the project goals would be compromised.

Yet all group members remained actively involved throughout the project, albeit in different forms and to different extents at different times. This occurred despite obstacles and challenges that arose within the project, not dissimilar to those discussed in Chapter 2. There were points in the project when, as described by group members, “sustainability fatigue” became an issue. Further, critical reflection can lead to unsettling dissonance (Barnett & Coate, 2005). Thus, as personal and group circumstances changed and the demands of the project continued, it might be expected that group member motivation and commitment to the project waned at times. However, group cohesion was supported and maintained in this project by recognising and addressing challenges within the context of the project. Thus, by dealing with challenges as they arose, group cohesion remained fairly constant over the years of the project. Arguably, this group cohesion contributed to the creation of the supportive learning environment necessary for transformative learning (Moon, 2004) and supporting group members’ ongoing preparedness to participate in transformative learning (Weimar, 2012).

The ways group members participate in, interact and experience the group project process significantly impacts upon what a group can achieve (Mnguni & Long, 2006). However, understanding the contribution and significance of how a group works together is often overlooked in the literature (Bell, Morse, & Shah, 2012). Consideration of the contribution and maintenance of cohesion within the project group in this study is, therefore, worth looking at more closely. A detailed example is now presented of how an intervention overcame a serious hiatus in the project process. How this issue was resolved highlights the contribution of group cohesion. Arguably, it also illustrates that an outcome of the intervention was the further enhancement of group cohesion. It is presented in narrative form

to reveal the more subtle aspects of the workings of the group. The intervention sits within the larger Cycle 1. It is an example of what Wadsworth (1998, p. 7) refers to as one of the:

countless tiny cycles of participatory reflection on action, learning about action and then new informed action which is in turn the subject of further reflection. Often these will pass unnoticed and unrecorded, but with practice these too become the subject of further reflection and group self-understanding. Change does not happen at “the end” – it happens throughout.

The Intervention

The intervention came 6 months into the project, and without it, the direction of the project could have changed significantly, possibly unravelling or stalling it all together. Figure 6.5 is a representation of this subcycle.

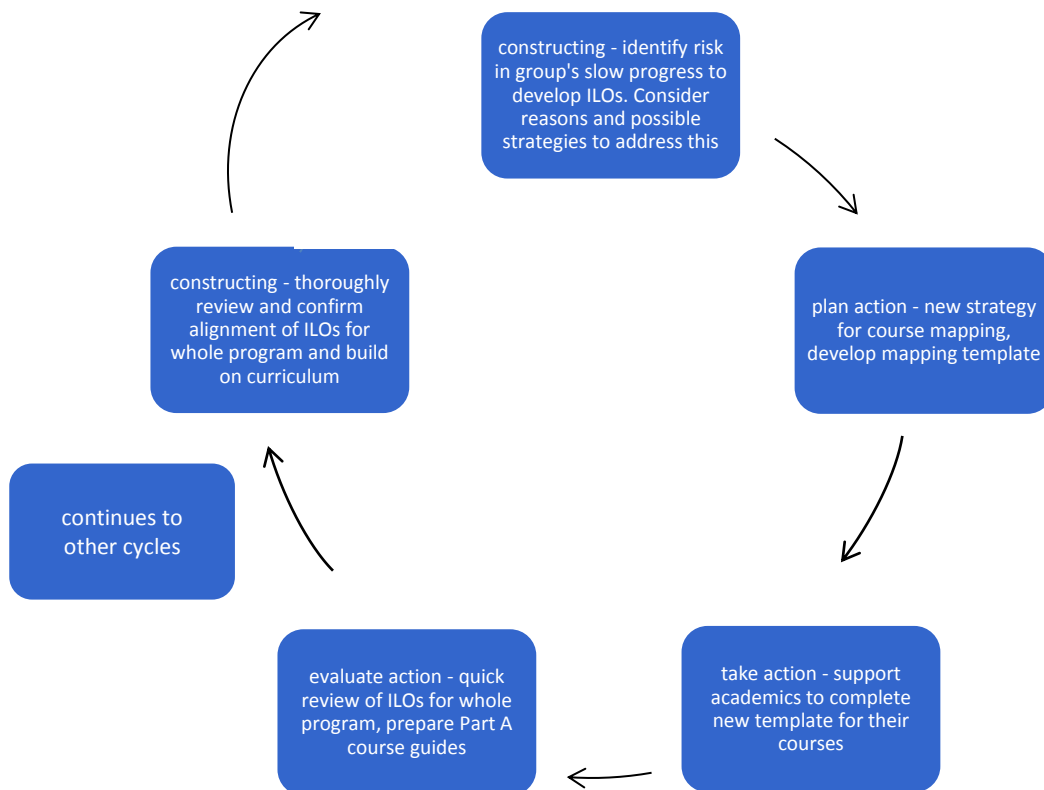


Figure 6.5: Subcycle of Cycle 1, intervention to support ILO development

It was during Cycle 1, in 2009, and a narrow window of opportunity existed to formalise the new curriculum for the following year, 2010. The group had already agreed to implement the new curriculum in 2010, which needed to be written and submitted to RMIT’s curriculum approval process in a few months’ time. The group had identified the array of knowledge, skills and values subattributes (Head, Heart and Hands) requisite for graduates to practise

sustainability within their professions. Group members had undertaken to individually identify the sustainability learning outcomes relevant to their courses. The group would then come together to map these learning outcomes across the program to ensure a coherent and comprehensive learning sequence for students over the course of the program. Following the mapping activity in the curriculum, change documentation would be formalised and submitted for approval.

The momentum and enthusiasm observed during the project thus far, seemed lacking for this task. The meetings to proceed with mapping sustainability ILOs and identify sustainability learning in relation to courses had been cancelled once and twice postponed. As the facilitator, I checked in with individual group members, who maintained they had started and intended to develop their course curriculum. The task was the first project activity individuals would undertake on their own. Identifying the ILOs for their course/s required them to make a decision, from which followed a commitment to teach the new courses; that is, to act. This seemed to be a challenging hurdle for some group members.

It occurred to me there was a very real risk the course documentation would not be finalised in time, which would undermine the project overall. I wondered why this was happening. Were group members too busy with other work, were they not ready to commit or was it just too hard, or was it a complex combination of all these? As the deadline to submit documentation approached, no one within the group came forward to take carriage of the mapping exercise. Having already made a number of offers to support individuals with the task, I felt there was little more I could do at this time. I was unsure how things would proceed.

A number of possible reasons for the impasse can be identified. Understandably, and as noted in Chapter 4, group members were not familiar with developing learning outcomes, having never had this responsibility before. They had previously inherited and taught courses with established learning outcomes. They also, at this point in the project, may not have felt confident enough in their understandings of sustainability to make those decisions. The exercise was asking group members to undertake the difficult task of critiquing their courses in unfamiliar ways.

Around this time, a group member (AB) and I were discussing the possibility of co-teaching a first-year class. During this conversation, I introduced the idea of the SOLO taxonomy as a way of framing the sustainability related learning goals, activities and outcomes for the class.

Our conversation progressed to discussing the sustainability learning outcomes in relation to the SOLO taxonomy for the whole program. Using the SOLO taxonomy, we identified that sustainability learning in TD involved students being able to explain, evaluate, apply and research aspects of sustainability.

AB was aware of slow progress on identifying ILOs. It occurred to us that framing the sustainability learning using SOLO could scaffold how other group members could describe their ILOs in one or other of these ways. This new strategy departed from the standard sequence of course guide development; that is, normally, ILOs were developed and concurrently linked with appropriate learning activities and assessment of a given course. This new strategy would first identify generic ILOs based on an appropriate level of the SOLO taxonomy, with the other details being developed later. This was an unconventional approach, but more flexible and possibly entirely pragmatic in the circumstance. On reflection, this approach was more authentically consistent with the way the courses were already taught in the program. Further, this approach was also consistent with sustainability learning principles, in that the learning is framed and contextualised within other course learning. It relied, however, on group members' ability to progress to identify and institute the appropriate learning activities and assessment to align to the course/s' ILO.

AB and I agreed to share the tasks inherent in leading this new strategy within the group. I would ensure the strategy would meet RMIT's requirements. Together we developed a template to assist group members to consider possible ILOs for their respective courses. I suggested AB undertake the task of discussing the new strategy and template within the group to establish its feasibility. It seemed to me that coming from an immediate peer, group members might be more responsive than if I suggested it. Selecting from the learning outcomes' "stems" presented in the template, group members readily identified the sustainability learning outcomes for their course/s (see Figure 6.6). Once group members were re-engaged, I provided support in further explaining the SOLO taxonomy. Along these lines, the final set of learning outcomes were developed that proceeded to formal approval. The revised Part As of the course guides were developed. These were later further validated in the mapping workshop (Workshop 4), which occurred after formal approval.

	To explain the elements of sustainability relevant to (insert course title)	To evaluate the relative significance of the elements of sustainability relevant to (insert course title)	To apply sustainability principles to the design process	To research and apply sustainability principles relevant to (insert course title)	Other – please specify	No sustainability learning outcome needed for this course.
Textile Design 1A			X			
Textile Design 1B			X			
Textile Studio 1A						
Textile Studio 1B			X			
Textile Industry and Technology 1A				X		
Textile Industry and Technology 1B	X	X		X		
CATD 1A		X	X			
CATD 1B			X			
Textile Design 2A	X					
Textile Design 2B			X	X		
Textile Studio 2A						X

	<i>explain</i>	<i>evaluate</i>	<i>Apply</i>	<i>Research</i>	<i>other</i>
Textile Studio 2B				X	
Textiles Arts and Culture					
Elective 1				X	
CATD 2A					
CATD 2B			X	X	
Textile Design 3A				X	
Textile Design 3B				X	
Textile Studio 3A				X	
Textile Studio 3B					
Textile Business and Careers 3A					
Textile Business and Careers 3B		X			
CATD 3			X		
Elective 2				X	

Figure 6.6: Learning outcomes selected for courses in preparation for mapping.

Reflecting on the intervention in terms of group cohesion, the initial slow progress to identify ILOs suggests declining group cohesion for some group members. The collaboration between

AB and myself represents strong cohesion, enabling us to develop and implement the intervention. That AB was able to re-engage group members suggests strong cohesion between AB and other group members. Overall, the intervention rebuilt group cohesion; the group were back on track to progress the project and motivated to continue.

On reflection, it is possible to see that the intervention was able to capitalise on the existing group cohesion. Arguably, group cohesion contributed to group members' disposition to engage in the project in the first instance, as well as the professional learning associated with the curriculum change project. The ongoing voluntary participation by group members in the project suggests the overall maintenance of strong cohesion within the group.

Group cohesion was supported within the project in the following ways. The group had (and this was enhanced by the project) a common vision for their work, based on their discipline and profession. Moreover, the development of the common language, referred to earlier, is evident in the intervention as the group came to engage with the SOLO taxonomy, and is a sign of unity of the group and of their mutual respect (Zuber-Skerritt, 2002), both necessary for group cohesion. The group talked about their responsibility to their students and to their industry, to make them as sustainable as possible by providing more sustainably skilled graduates and through interactions between group members and industry. As discussed in Chapter 4, group members felt a responsibility to change the curriculum such that students could graduate into the TD industry ready to contribute and take on leadership roles to progress sustainable practice within industry.

Moreover, the project supported the existing group cohesion to be strengthened further, as illustrated in the following remarks of a group member.

Extract from final survey of group members:

Respondent 7: Although we have always been a close collaborative team, this has been a great opportunity to demonstrate our teamwork. This project has further helped to strengthen the program team. By focussing on sustainability as a group, we have shared our learning, approaches and individuals have carved out new areas of expertise – this is a great thing. For sustainability to be meaningful and a change agent, it must be shared and as diverse as possible.

The co-location of the group, including the facilitator, contributed to successfully immerse the group in the project. Co-location provided opportunities for informal and ad-hoc interactions among group members to “come together naturally in collegiate, joint spaces for

discussion and sharing of good practice” (Crawford, 2010, pp. 197–198). Informal lunchtime group conversations allowed the group tease out issues, connect and agree on the way forward, consistent with the findings of Liddy (2012) and Zuber-Skerritt (2002). The many complementary activities described in Chapter 5 also provided opportunities to build group cohesion.

In the existing literature, group cohesion has been identified as an indicator of success (Franz, 2012). As this account of the intervention indicates group cohesion was harnessed at times to support the resolution of an impasse in the project. Specifically, individual group members found identifying course ILOs challenging, yet their cohesion as a group meant they were open for these to be addressed collaboratively.

Cohesion and disciplinarity

The embedded model calls for a discipline-based approach to sustainability-related curriculum change. This lends itself to group cohesion that arguably, inter- and transdisciplinary approaches may struggle with in the first instance. Yet, inter- and transdisciplinary approaches are presented in the literature as important for bringing about the transformative change necessary for sustainability curriculum change (Wals, 2011). At the same time, however, inter- and transdisciplinary approaches have been found difficult to realise (Jones, Selby, & Sterling, 2010). As Jones et al argue, this can be due to: “suspicion, scepticism and reluctance [amongst participants of differing disciplines], not least by those who view career prospects are regarded as lying with their known, disciplinary areas” (p.29). The success of this project points to the advantages of adopting a disciplinary approach in the first instance.

6.2.4 Key success factor 4: Responsive facilitation

The fourth and final key success factor to be considered here is responsive facilitation, which is reflected throughout the open-ended action research cycles. Responsive facilitation also underpins each of the success factors already discussed. In this project, facilitation refers to leading and supporting the professional learning of the group. The facilitation approach ideally aligns with the intent of the professional learning (Land, 2001); in this case, transformative learning. According to Kirk and Broussine (2000), the aim of facilitation is to set up and maintain a learning environment, with the task of facilitation being to: “enable the group to create learning and to be aware of the processes of doing so experientially through the dynamics of the group” (p. 13). The facilitation approach used in this project, as discussed

in Chapter 2, was informed by learner-centred teaching approaches combined with providing learning and teaching expertise as required; inherent in this approach is responsiveness.

The Intervention, as described in section 6.2.3., provides an illustration of this, as it shows the dynamic and potentially conflicted setting the facilitator works within. Here, responsive facilitation involved evaluating the benefits of curriculum change against the group's readiness for curriculum change. As facilitator (and researcher) I saw value in the curriculum change proceeding as soon as possible. I believed a shorter timeframe would support the group's professional learning as they would implement, observe and evaluate the changes, providing opportunity for experiential learning, as well as bringing forward student sustainability learning. However, at the same time, I needed to consider that the group may not be ready to proceed and that to do so might undermine the project overall. As Johnson-Bailey (2012) points out:

...there is a definite vulnerability for teachers and [learners] when the intent is to disrupt status quo thinking by creating the disorienting dilemma critical to transformation. Therefore it is prudent to ask what matters most: the possible growth through transformation or the potential harm or painful cognitive dissonance that may be experienced? (p. 261).

This situation pointed to the need for close observation, tentative approaches, and careful judgement on the part of the facilitator when supporting transformative learning. This is an example of the academic developer's "elastic practice" (Carew et al., 2008). Responsive facilitation promotes group cohesion by actively monitoring, interpreting and supporting appropriate interventions to support the group through the naturally dynamic process of curriculum change (Peseta & Manathunga, 2007). The embedded model enables elastic practice as the facilitator is integrated into the project, supporting responsiveness by providing opportunities to observe at close quarters. The ability to interpret a situation, determine the dynamics of the group and assess potential risks are all required to support change. Facilitation that occurs over time and is attuned to effective timing of actions and change is also essential (Cowan et al., 2004). My deeper understanding of the changing context could only arise from the embedded nature of my practice in the project over an extended period. Along with the other group members, I also contributed to the development of our common language, as discussed earlier in the chapter.

At the same time, I recognised that to dictate a key direction for the project was counter-productive. To do so would disempower the group and undermine the project, as it was

unrealistic to expect the group's commitment if they did not agree with such a change in project direction. When important decisions needed to be made, rather than direct the group, I aimed to support a learning process where group members made informed decisions. Hence, as Gravett (2004, p. 263) recommends, I was "... careful not to advance a specific version of dialogic teaching, but to model my approach intentionally and to create a space conducive to participants constructing their own versions of dialogic teaching in small learning teams". Indeed, the use of learner-centred approaches to inform the design and implementation of professional development programs promotes the development of learner-centred approaches for participants (Polly & Hannafin, 2011).

Further, a sign of responsive facilitation was the diminished need for facilitation that came about towards the end of the project. As referred to in Chapter 5, during Cycle 3, group members worked far more in pairs and in subgroups, as well as in self-directed ways than in earlier cycles in order to research and progress change in their assessment practices. The group had become more empowered, through enhanced sustainability and learning and teaching capability, to initiate and bring about further improvements to their teaching and the curriculum. The project had already modelled and set up a critical and reflective group environment in which learning and teaching matters were reviewed and addressed. This critical and reflective group environment had become normalised and continued beyond the facilitator's involvement. Consistent with an ideal of action research, the leadership of the researcher/facilitator reduces as the group takes up a greater leadership role (Burns, 2000). Here is an example of system change arising from the project (Creswell, 2005). A new group culture was realised, consistent with the aims of action research (Burns, 2000).

It is not enough to rely on educator self-reflection in order to achieve critical reflection (Day, 1993). Facilitation that includes critical questioning in a supportive environment normalises critical reflection. For instance, in Workshop 9, after the group had problematised the student survey data, as facilitator I asked group members what role they had in supporting student confidence (see extract below). The conversation continued with a group member relating the issue to an example in her teaching where students had found the work difficult. By reflecting on the student experience and responses, she shared with the group her own reflective process, revealing her own challenges with her sustainability teaching. This concluded with her seeing her teaching role as supporting students to persevere by helping them develop their problem-solving skills and as a result develop their confidence.

Extract from transcript Workshop 9:

Facilitator: Do you think it is your job to sort of make them feel more empowered about that? I mean would you like to see that [confidence] increase over time? Or is that [level of confidence] about right?

AA: The project I've just done with second years is on merchandising, they all come away with, "O God we have all these amazing goals and we wanted to print with soy inks on totally sustainable paper" ... [describes challenges students face] ... All of those things are barriers to goal outcomes and initially their responses were really, "Ur, this is so hard". Second project they still have to address the same issues, and it is interesting – I have been reading their reports on what they plan to do today, and some of them are apathetic but others are saying, "Well I am just going to take a totally different tack or I'm going to make my goals more achievable", or "I am going to do something different". So there is some creative thinking that can come out of that.

Facilitator: Challenge?

AA: Challenge, yes, so I think the important thing is to help them problem solve and troubleshoot those issues rather than [let students] just say "Okay, it is all too hard".

This section of transcript highlights the value of creating a learning environment that promotes critical questioning. My opening question in the excerpt could be seen as quite confronting for group members. Yet, at this point in the project, at the very end, such a critical environment was normalised and seemed non-threatening to group members. To mitigate the challenge to group members, my question was deliberately open ended; however, it was not rhetorical, it invited a response. As the embedded facilitator, I was close enough to the action and knowledgeable enough about it to provide the feedback needed to encourage group members to critically reflect on their experiences and practices (Haskell, 2001). In this way, I had modelled an approach for dealing with the political nature of sustainability learning (Kirk & Broussine, 2000).

In relation to developing a common language around sustainability learning, the facilitation provided the learning and teaching discourse and encouraged the group to engage by relating their TD experience through learning and teaching language. These key success factors are mutually reinforcing, with the facilitation role bringing it all together through the group dynamic; a dynamic created by the elements of the embedded model. The role of the facilitator involves being able to bring people with different perspectives together to promote the sharing of ideas (Fraser, 2006). The open-ended approach of the embedded model supported responsive facilitation with adaptable, elastic practice, in order to better meet the needs of the group (Carew, et al., 2008). The model does not prescribe to the group what they

should do; rather, the model provides principles that require participants to work things out as they go, supported by facilitation based on the other three success factors.

The facilitation itself is holistic and embedded in order to be responsive and timely. Being seen as part of a group, rather than as an instrument of the university, supported cohesion (Wright, 2009a). An easy collaborative working relationship was in part supported by my co-location in the TD staffroom. While I did not want to impose my presence in the group's workspace, I thought it would be advantageous to immerse myself in the culture of the program and develop collaborative working relationships with the group that I felt would support the project. Early in the process I asked the HOS if there was a space somewhere on campus I might be based. With the approval of the group, I was conveniently offered a hot desk in the TD staffroom.

This meant, therefore, that the facilitation itself was embedded. My colleagues in the TD group extended to me membership of their team. I was included in and invited to many events arranged by the group, including small social celebrations, school and program events and professional development opportunities relating to TD. Over a number of years, these included attending the Premier's Sustainability Award ceremony, the School of Fashion and Textiles Christmas party, and guest lectures organised by the School and members of the group as well as attending, contributing to and/or running activities at the School's community sustainability conference/fair. I was invited to be involved in the teaching of students. I co-taught a number of sustainability-related classes with academics and was regularly invited onto panels to provide student feedback. All these complementary activities supported the building of a trusting learning environment needed to support critical reflection.

The facilitation was also valued by the group. Group members responded anonymously in the final survey to the optional question: "If you would like to add any further comments or reflections about the project, please use the following box". Five of the seven group members responded to that particular survey question, yet each highlighted the contribution of facilitation.

Respondent 1: Thanks Fiona, it's been a great professional development exercise for the team. I think we're in a much better position than we were pre 2010.

Respondent 3: Fiona, your presence in our program has been energising and positive and your warm and engaging manner has meant that this has been a great journey. Your

facilitation has been a major force in assisting us to achieve some great outcomes for the program – you are a great change agent!

Respondent 4: Not going to deny that the project was challenging at times. Fitting in the meetings, keeping to deadlines, rewriting course outlines, content and projects. But it was rewarding to have committed as a staff group and to keep each other on track. There was a huge advantage and assistance in having a facilitator (maybe the better description is mentor) who challenged us to reflect on our L&T practice in quite specific ways to get the project rolling along and also to maintain its momentum. This facilitation was across a theory base but also within our teaching practice, sitting in on classes, participating in certain learning activities and analysis of assessment in 2010 really impacted on my teaching preparation and habits. Especially by reflecting on how I guide students to participate in theory or concept driven skills and content.

Respondent 6: Thank you!

Respondent 7: Thank you Fiona for all your input. I think much of the project's success to embed sustainability is because of your hands-on approach and enthusiasm for the project. Thank you!

The following extract indicates the facilitator is seen as adding value to the project work.

Extract from post-project reflection, AF: A key factor in enabling the changes and progression of the [student project] brief has been the role of the facilitator. There was a huge advantage and assistance in having the facilitator involved, who challenged staff to reflect on our learning and teaching practice in quite specific ways to get the project rolling along and also to maintain its momentum. This facilitation was initially across a theory base and involved mapping sustainability within our courses and aligning assessment with learning outcomes. But their guidance also ventured into our teaching practice, by sitting in on key briefing and lecture sessions, participating in guided learning activities, attending the final student presentations, and also analysis of assessment criteria. This practical interaction with the facilitator really impacted on my teaching preparation and habits because it allowed a space to debrief on the clarity of the [student project] brief and the reaction of the students.

As this discussion has sought to demonstrate, the embedded model supports the building of collaborative relationships. Wadsworth (2010) highlights the importance of interpersonal relationship and the use of a dialogic methodology to support systemic improvement projects. There is a need for creating trust in the learning environment (Hall, 2003). Being co-located with the group meant regular informal opportunities to better understand the day-to-day

context of the project and to interact with the group, and contributed to building my collegial relationship with the group.

The scholarly activities associated with the project supported relationship building between the facilitator and the group. Working in a community of scholarship, facilitators are more likely to be seen as peers, thus promoting trusting relationships and engagement in the project (Brew, 2003). Three academic papers were written collaboratively. Across the three papers, five out of seven members of the group were co-authors in at least one of the papers. Each paper used the group's shared language, combining aspects of TD and sustainability with learning and teaching. The writing of the papers involved intensive collaboration among co-authors. The papers considered aspects of the project process and so provided an added impetus and vehicle for reflection. That the papers were all peer reviewed stressed the need for critical reflection in writing the papers and also brought external perspectives into the group's process. The papers also provided a valuable outcome in terms of contributing to the group members' research output, as well as emphasising to the group their own growing expertise in sustainability-related curriculum change. The award submissions and wins contributed in the same way in terms of external recognition. But in terms of facilitation, the papers and the awards extended opportunities to collaborate, develop relationships and deep reflection on practice, all contributing to creating a learning environment supportive of transformation overall.

There are certain skills associated with timely and responsive facilitation, including being able to collaborate on researching educational issues, engage in team work, develop expertise in learning and teaching, understand the university's procedures, and to have the ability to negotiate these (Burns, 2000). Bringing these skills to the process enhances the facilitator's credibility (Peseta & Manathunga, 2007). Yorke (2002) points out that the skills a facilitator brings to a project arise from previous experience and practice. Based on this view, the success of this project – and other similar projects – depended upon, in some part at least, having an experienced facilitator.

6.3 Success Factors Not Attributed to the Embedded Model

Finally, it is important to acknowledge that there are a number of factors that supported and enabled the project that are not attributable to the embedded model. These are factors associated with the context in which the project was undertaken, as presented in the SWOT analysis early in the project (see Figure 6.7). Additional factors supporting the success of the project include:

- having a knowledgeable sustainability champion;
- a discipline predisposed to innovation;
- office co-location of academics.



Figure 6.7: Pre-project advantages supporting sustainability related curriculum change.

These existing factors were all positive presage factors that influenced the success of the project. A given presage factor might, however, influence engagement in learning both positively and/or negatively. And indeed, other factors could have made the project more difficult or less successful; or even each of the above factors may have had negative impacts on the project as well as positive impacts. The more general point is that presage factors can be various and subtle, and influence the project in unforeseen and unknowable ways. They will, however, be present regardless. The task is to anticipate that these factors exist (known or unknown) and contribute to the context as a whole. They are accepted into the mix. It is possible to shape or influence presage factors to create a more conducive learning environment (Biggs, 2003b; Moon, 2004). Hence these factors, or the broader influences they bring, need to be harnessed if possible to support the project, or at least mitigate for negative impacts, consistent with learner centred approaches to professional learning. The embedded model anticipates and requires consideration of these factors.

One of these presage factors is the climate of readiness that existed within the group (Southwell et al., 2005). In seeking a group to work with, I shared a vision with the group as well as the HOS (Coghlan & Brannick, 2010), or at least a convergence in understanding of the project before I committed to proceeding further (Zuber-Skerritt & Fletcher, 2007). Context is enormously significant to the action research process and outcomes. But

transformative learning is voluntary. Those seeking to promote the sustainability curriculum change need to account for this before setting out. To embark on the learning journey to embed sustainability in the curriculum relies on certain contingent presage factors being in place, not least of which are, as has been referred to previously, that group members see the need for sustainability in their curriculum and voluntarily participate and are empowered to undertake change. In cases where such contingent presage factors are not already in place, there would be an argument for actively developing them prior to commencing a sustainability-related curriculum change project. If these factors are not in place, it would seem from the premise and findings of this study, there could be little realistic hope of achieving the transformative changes necessary to support deep and lasting sustainability learning (Wahr et al., 2013).

Hubball, Gold, Mighty, and Britnell (2007) present a continuum of support stages for those involved in curriculum change, where what might normally be considered the start of the curriculum change work (the action plan stage) is preceded by three preparatory stages. The preparatory stages involve identifying motivations to participate, forming the project group with appropriate learning and teaching facilitation, and collaboratively determining the broad goals and approaches to be used. These three preceding stages align exactly to the pre-step stage of this project, as described in Chapter 4 and Chapter 5. Hence, this preparative work could be seen to be inherently present within the embedded model when applied using an action research methodology. This suggests the embedded model should be preceded by the preparatory stages recommended by Hubball et al. (2007).

6.4 Chapter Conclusions

The success of the project undertaken within this study is not serendipitous. The embedded model deliberately sets up and dynamically maintains the conditions to support group members' concurrent and ongoing engagement in a facilitated professional learning environment. In this sense, the embedded model needs to be seen as a holistic approach to sustainability-related curriculum change. While this chapter highlights four key success factors arising from the implementation of the embedded model that have contributed to this project, all of the elements of the model have contributed in some way to the success of the project. In order to realise the full potential of the model, all the elements need to be treated as mutually reinforcing and should be applied together and concurrently for greatest effect.

In summary, the implementation of the embedded model has allowed the group to work on issues regularly, in just-in-time ways. Discussion and critique is normalised. It has built the

normalisation of learning and teaching into the group culture. While this already existed to an extent, it has deepened and strengthened to the extent that sustainability curriculum change could be achieved. Group members gained confidence in their learning and teaching skills and knowledge to question, change and refine their practice. This is supported by both their own team cohesion and the contribution of thoughtful and enthusiastic facilitation. These were supported and encouraged by the embedded model.

Chapter 7: Conclusions

7.1 Introduction

This study aimed to extend existing knowledge about achieving sustainability-related curriculum change in universities. It is premised on a widely held view that sustainability learning in higher education curricula is necessary to inform the practice of graduates and professionals in order to contribute to a more sustainable world. Yet, progress has been slow to bring about evidence-based, lasting sustainability-related curriculum change.

The challenge for those wanting to see sustainability-related curriculum change progressed is that of achieving genuine transformative learning. For students, this means viewing and therefore being taught sustainability knowledge, skills and values as core to their discipline and prospective professional practice. While it is possible to teach sustainability in stand-alone courses, this treats sustainability as an optional add-on to how students see their profession, leaving the rest of the curriculum to uncritically reinforce unsustainable norms. By contrast, this thesis has argued that sustainability needs to be embedded within every aspect of the curriculum.

For academics who design and teach the curriculum, this means viewing sustainability as core to their discipline. Academics within disciplines that do not traditionally include sustainability as integral will therefore need to reconceptualise their disciplinary understanding in order to incorporate sustainability into their teaching; no small task. And if this reconceptualisation is achieved, are academics then able to translate sustainability learning into their teaching? For those who wish to see sustainability incorporated into higher education curricula, these are formidable challenges. Nothing short of transformative professional learning for academics is needed.

7.2 The Embedded Model

By acknowledging and responding to these challenges, the embedded model seeks to provide the transformative professional learning needed by academics to bring about sustainability-related curriculum change. The embedded model is informed by the sustainability learning literature and the academic development literature, and has been refined and honed, based on the outcomes of this study. It combines a number of elements that when applied holistically create a supportive professional learning environment to promote transformative change. The embedded model inherently requires contextualisation.

This thesis has argued that the success of the sustainability-related curriculum change project in the Bachelor of Arts (Textile Design) at RMIT University is in large part attributable to the embedded model. The project outcomes include incorporation of sustainability as a core component of the program, achievement of sustainability learning among students and, most significantly, transformative change among the academics involved in the project. This occurred in relation to understandings both of their discipline and their role as teachers of sustainability. Hence, in this context at least, the embedded model has been validated.

Four key factors were identified as key to the project's success; normalisation of critical reflection within the project; development of a common language within the group; maintenance of group motivation; and responsive facilitation. Each of these can be attributed to multiple and mutually reinforcing elements of the embedded model. Hence the importance of implementing the embedded model as an integrated system.

The embedded model provides holistic support for academics. This occurs within a process of facilitated curriculum change, where the development of skills and knowledge to support the curriculum change are identified and addressed on an 'as needs' basis as they arise. This scaffolding of learning is deliberately flexible and adaptable to meet the changing needs of the group at particular points and stages of the project. The facilitative model aims to be empowering as it requires participants are active decision makers in the curriculum change process. A further empowering aspect is that participants develop the additional knowledge and skills to transfer and apply their learning to other teaching and curriculum-related contexts. The scaffolding, therefore, is flexible and discrete, yet also strong and enduring. Professional learning is incremental and normalised within the process of curriculum change, that when assisted by the action research methodology, integrates and builds capability for critical reflective practice.

The embedded model also provides opportunities for group members to critically reflect on their teaching practice to develop and trial new approaches, and then to evaluate these and critically reflect again. In other words, group members challenged core assumptions and understandings, leading to action that changed their practice. In doing so, the academics in this study achieved what is recognised as the fundamental barrier to achieving sustainability-related curriculum change; that of transformative change. The provision of opportunities for critical reflection is not unique to the embedded model. What is most significant, however, is that these opportunities were taken up by group members on a sufficient scale to bring about significant sustainability-related change to their courses, their teaching, their program overall

and to the students of the program. The embedded model promoted this by ensuring the curriculum change occurred within the familiar and local context of the academics' discipline and among peers, where new conceptualisations of the discipline could be discussed. That the group was made up of discipline peers, among whom there was existing cohesion, allowed the project to move through difficult moments more easily, helping sustain engagement in the project overall. In this way, the embedded model provides insight into the difficulties experienced by others seeking to bring about sustainability-related curriculum change using transdisciplinary approaches.

The study suggests that the benefits of transdisciplinarity might come later in a project when the discipline group themselves recognise a need for transdisciplinarity, given that transdisciplinarity arises from the critical thinking process (Dawe et al., 2005). Accordingly, academics might be more likely to seek out transdisciplinary approaches if they reach such a conclusion for themselves, when they have critiqued the limitations of their own discipline's contribution to the sustainability curriculum and consequently recognise the benefits of interdisciplinary collaboration. If academics recognise transdisciplinarity as contributing to their own curriculum change goals, this is arguably much more likely to build group cohesion that includes other disciplines, hence strengthening the curriculum change process. Such a process, as reflected in the embedded model, necessarily commences within the discipline. This study supports the view that critical reflection occurs best in safe and trustworthy learning environments, such as disciplinary settings. Ideally, a critically reflective, empowering disciplinary setting for curriculum change projects will result in the group recognising the need for transdisciplinary approaches and therefore taking action to achieve this themselves.

The embedded model calls for facilitated curriculum change. In particular, facilitation providing learning and teaching expertise and skills supports the critically reflective process. Via the facilitator, the group were able to develop a common language around sustainability, textile design and learning and teaching. This allowed the group to voice concerns, share ideas, and develop understandings more easily.

7.3 Challenges Associated With the Study

Implementing the embedded model in this study has not been without challenges. These arise from the aims of the project, which are inherently challenging: transformative professional learning to support sustainability-related curriculum change does not come easily. However, that challenges arose does not diminish the potential contribution of the embedded model. On

the contrary, such challenges are to be expected. That the embedded model provided a means to resolve these challenges and continue to progress the project demonstrates the effectiveness of the model.

For example, as discussed in Chapter 6, some conflictedness arose between the aims of participants and those of the facilitator/action researcher in relation to developing the ILOs. In order to support academics' engagement in the project and thus maintain the integrity of the project, the aims of academic participants took priority (Alvesson & Deetz, 2000; Zuber-Skerritt & Fletcher, 2007). Failing to prioritise the aims of academics risked responses of pragmatic instrumentality (Corcoran, et al., 2004a). These tensions can prove complex to resolve (Coghlan and Brannick, 2010). In this case, responsive facilitation supported recasting of the issue, which was then resolved through "the intervention" as described in Chapter 6. Nonetheless, these tensions must be anticipated and worked through if initiatives genuinely seek to achieve emancipatory goals (Corcoran et al., 2004a); goals inherent in transformative professional learning.

Another challenge associated with the study has been the sheer scale and complexity of a project such as this and effectively communicating it to others. One such issue is that of conveying the atmosphere and culture of the group. The atmosphere and culture reflect aspects of the the learning environment, for instance, indicating whether trusting relationships exist between group members and/or the facilitator, which has implications for the success of the project. However, given that atmosphere and culture are not explicitly described amongst the data, it has been difficult to demonstrate the genuine collaboration and collegiality within the group (including myself) in the achievements of the project. A related challenge has been deciding how to make best use of the vast amount of data arising from the project: how to carefully select the stories that depict this atmosphere. The study has provided examples of a large range of types of interaction within the group, from the big picture of group interaction to the smaller, more intimate moments. Determining how to report on the action research cycles was complex, as multiple cycles are underway at any one time for individuals and the group. In preparing this thesis, I decided to focus on the group process, with small vignettes to show the one-to-one or more subtle interactions or activities that demonstrate the atmosphere of the project so well. What to leave in and what to leave out? There are still many other stories and learnings among the data, yet to be written up and shared.

7.4 Transferability of the Embedded Model

When considering the potential transferability of the model, it must be recognised that each program where sustainability-related curriculum change is sought is a unique context. It is not possible to claim on the basis of this study that the embedded model will prove equally successful in any context. This is indeed a methodological limitation of the study (Corcoran et al., 2004a). Action research is context-focussed research, responding to real world issues located in authentic, dynamic and multifaceted settings, which are therefore uniquely complex. Transferrability to other contexts is nonetheless possible. Contextualisation of the elements of the embedded model offers potential for success in other settings; however, this can never be guaranteed. Transferability is most likely if the key success factors, discussed in Chapter 6, can be achieved. Further, it is important that academics are involved voluntarily and empowered to trial and make changes to the curriculum. It is also important that those involved agree on the need for change, or are prepared to engage in preliminary stages to work toward a shared vision for change, consistent with the stages presented by Hubball, Gold, Mighty, and Britnell (2007). In cases where such group cohesion is not present among the group at the beginning of the project, intervention can support groups to become more collaborative and cohesive (Franz, 2012).

It also needs to be recognised that bringing all these elements together in other contexts is likely to prove demanding. This is a risk associated with the embedded model. If it is considered too difficult to implement, higher education institutions may not even attempt it. Higher education institutions' commitment to sustainability learning is likely to be tested by the demands of the embedded model. However, given the lack of progress in bringing about lasting sustainability-related curriculum change to date, and given that less holistic approaches have not delivered the extent of change needed, the investment associated with the embedded model can be justified.

7.5 Reflections on Facilitation

The crucial role and contribution of facilitation cannot be overstated in a project such as this in providing learning and teaching expertise, project leadership and organisation, and a critical voice to support the success of the project. As Levin (2012) argues: "... the researcher must be able to take a step back from the involvement and critically analyze what he or she has participated in" (p. 143). Facilitation needs to be subtle, motivating, reliable, smooth, wise, in touch and ego-less/altruistic. This requires gymnastic insight, as well as a flexible and responsive practice on the part of the facilitator, including a disposition to develop close

and trusting collaboration between academics; a critical and reflective approach to the reviewing of the curriculum and teaching; as well as a holistic perspective (Dirkx, 2006; Miller, 2007). The open-ended action research approach has supported this style of facilitation as it provided opportunities for experimentation and reflection.

Responsive facilitation requires the facilitator to bring a range of necessary skills and qualities to the project. As responsive facilitation supports critical reflection by modelling it, the responsive facilitator requires the capability to be self-critical about their own practice. In asking others to question their own understandings, I, as facilitator in this project, maintained a process of questioning my own understanding by being open to other interpretations and value systems. This is consistent with Wals' (2010a) advice, who argues that by:

[r]ecognizing and, as a result, going beyond one's own limits might be essential in creating innovation and triggering transitions that can break with existing systems and routines. After all, we do not know (all) the answers and live in a world marinated in uncertainty and complexity. It is in this world that we need to address the challenge of sustainability with some urgency. Hence we need new forms of learning that can help us break existing routines and systems that appear fundamentally unsustainable. (p. 145)

The facilitation role in the embedded model is consequently highly demanding. In the application of the embedded model I experienced particular challenges during the project unique to my role. These included issues recognised in the literature, such as "loss of control, the sharing of decision-making, greater accountability and (probably) extra time demands" (Gibbs, 2001, p. 30). Working from within organisations on local issues also brings additional challenges to negotiating aspects of the project work. Deciding the issues to address and responding to a changing context creates pressures on interpersonal relations (Coghlan & Brannick, 2010). Moreover, the action researcher role can be especially difficult as research outcomes may conflict with the needs of the group and/or organisation (Kincheloe & McLaren, 2002). For these reasons, facilitating action research is recognised as more complex and problematic than other methodologies generally (Zuber-Skerritt & Fletcher, 2007).

Facilitator resilience is also a factor contributing to the success of the project. In the face of the challenges of prolonged facilitation, the project might have languished. What sustained me as facilitator was the collegiality and cohesion afforded to me by the group collaboration: I felt part of the group and shared the goals of the project with the group. The following quote

resonates very strongly for me in my role as facilitator in relation to the demands and complexity of this project:

Being a change agent means living in and between two worlds. One is the work of inner experience, of personal meaning, of selfhood. The other is the outer world of action. The inner world is the real challenge for change agents. Paradoxically the secret to changing the world about us is only discovered within ourselves. (Dunphy et al., 2003, p. 269)

Projects such as these must recognise the contribution of facilitation (Brew, 2003). The success of the embedded model relies on responsive facilitation; yet, those able to provide this may not be available or willing. Appropriate preparation for those undertaking the facilitation role will also need to be provided before the embedded model can be applied elsewhere.

7.6 Recommendations for Further Research

In this thesis I argue there are no half measures with respect to achieving the embedded model: all elements must be in place in order to hope for successful outcomes. It would, however, be worthwhile for other studies to test this claim, with the aim of refining the embedded model further. This could be done by implementing the embedded model in ways that place greater or lesser emphasis on particular elements of the model, especially if this is incorporated into the process of contextualising the model to a given situation. Further, applying the model to different discipline areas would be useful in terms of shedding light on discipline influences on the success of the embedded model.

7.7 Recommendations for Progressing Sustainability Learning in Higher Education Institutions

As indicated by the slow extent of sector-wide change, acceptance of sustainability learning as core to higher education is not yet in place. The status and extent of sustainability-related curriculum change reflects the existing culture of the higher education institution (Wals & Jickling, 2002). Where sustainability learning is present in strategic statements but not embedded across the institution's curricula, pro-sustainability structural change is needed that includes proven approaches to support sustainability-related curriculum change (Franz-Balsen & Heinrichs, 2007; Holdsworth, Bekessy, & Thomas, 2009; Sterling, 2004a). Specifically, to progress sustainability learning change, a whole-of-organisational response is required, incorporating critical thinking, reflection and change to curriculum policy and procedures (Cranton, 2009; Sterling, 2004; Sterling & Witham, 2008; Tilbury, 2011b) and supported by organisational learning (Holdsworth et al., 2006, p. 10). As demonstrated by

this study, the embedded model has potential to promote sustainability learning as an innovative, bottom-up initiative. Appropriate dissemination strategies are, therefore, needed to make this a reality within and among higher education institutions (Southwell et al., 2005).

7.8 Chapter Conclusions

In summary, the embedded model offers an evidence-based approach and way forward for higher education institutions to successfully fulfil their responsibilities to promote a more sustainable world. By providing academics with transformative professional learning through sustainability-related curriculum change, students are more likely to graduate with the necessary knowledge, skills and intentions to act sustainably in their professions. In fulfilling these responsibilities, however, higher education institutions must recognise that bringing about transformative change is not easy and requires the genuine commitment of appropriate levels of support and resourcing. The study confirms that the resourcing of such projects, while intensive, can potentially achieve genuine transformative learning and curriculum change.

References

- Adams, J. (2004). Mental models @ work: Implications for teaching sustainability. In C. Galea (Ed.), *Teaching Business Sustainability Vol. 1: From Theory to Practice* (pp. 19-33). Sheffield: Greenleaf Publishing.
- Allwood, J., Laursen, S., Malvido de Rodriguez, C., & Bocken, N. (2006). *Well dressed? The present and future sustainability of clothing and textiles in the United Kingdom*. Cambridge: University of Cambridge, Institute for Manufacturing.
- Alvesson, M., & Deetz, S. (2000). *Doing critical management research*. London: Sage Publications.
- Anderson, G. (2008). Mapping academic resistance in the managerial university. *Organization*, 15(2), 251–270.
- Anderson, T., & Christiansen, J. A. (2004). Online conferences for professional development. *Information Age Publishing*, 13–30.
- Angelo, T. (1999). *Doing academic development as though we valued learning most: Transformative guidelines from research and practice*. Paper presented at the HERDSA Annual International Conference, Melbourne, Australia.
- Arbuthnott, K. D. (2009). Education for sustainable development beyond attitude change. *International Journal of Sustainability in Higher Education*, 10(2), 152–163.
- Arkoudis, S. (2014) *Integrating English language communication skills into disciplinary curricula: Options and strategies*. Sydney: Australian Government, Office of Learning and Teaching.
- Argyris, C. (1982). *Reasoning, learning and action: Individual and organizational*. San Francisco: Jossey-Bass.
- Argyris, C., & Schön, D. (1974). *Theory in practice: Increasing professional effectiveness*. San Francisco: Jossey-Bass.
- Ashwin, P. (2008). Accounting for structure and agency in ‘close-up’ research on teaching, learning and assessment in higher education. *International Journal of Educational Research*, 47(3), 151–158.
- Australian Campuses Towards Sustainability. (2011). Green gown awards Australasia, 2011 winners. Retrieved January 1, 2013, from <http://www.acts.asn.au/index.php/programs-and-initiatives/green-gown-awards-australasia/green-gown-awards-australasia-2011/2011-green-gown-award-australasia-winners/>
- Baker, G., & Henson, D. (2010). Promoting employability skills development in a research-intensive university. *Education+ Training*, 52(1), 62–75.
- Baldwin, L., Paul, R. J., & Scoble, R. (2000). *Evaluating standards in higher education: The use of performance indicators*. Paper presented at the AQHE 2000 – The Twelfth International Conference On Assessing Quality in Higher Education, RMIT University, Melbourne, Australia.
- Barber, J. (2007). *RMIT Learning and Teaching Strategy 2007–2010*. Melbourne: RMIT University.
- Barnett, R., & Coate, K. (2005). *Engaging the curriculum in higher education*. Maidenhead, UK: Open University Press.
- Barrie, S. (2005). Rethinking generic graduate attributes. *HERDSA News*, 27(1), 1–6.
- Barrie, S. (2006). Understanding what we mean by the generic attributes of graduates. *Higher Education*, 51, pp. 215–241.
- Barrie, S. C., & Prosser, M. (2004). Generic graduate attributes: Citizens for an uncertain future. *Higher Education Research & Development*, 23(3), 243–246.
- Barth, M. (2013). Many roads lead to sustainability: A process-oriented analysis of change in higher education. *International Journal of Sustainability in Higher Education*, 14(2), 160–175.
- Barth, M., & Rieckmann, M. (2012). Academic staff development as a catalyst for curriculum change towards education for sustainable development: An output perspective. *Journal of Cleaner Production*, 26, 28–36.
- Barth, M., & Thomas, I. (2012). Synthesising case-study research—ready for the next step? *Environmental Education Research*, 18(6), 751–764.
- Bath, D., & Smith, C. (2004). Academic developers: An academic tribe claiming their territory in higher education. *International Journal for Academic Development*, 9(1), 9–27.

- 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 and Development*, 23, 313–328.
- Beard, C. M., & Wilson, J. P. (2006). *Experiential learning: A best practice handbook for educators and trainers*: Kogan Page Publishers.
- Beaty, L. (1998). The professional development of teachers in higher education: Structures, methods and responsibilities. *Innovations in Education and Teaching International*, 35(2), 99–107.
- Beaty, L., & Cousin, G. (2003). An action-research approach to strategic development: A case study. In H. Eggins & R. Macdonald (Eds.), *The scholarship of academic development* (pp. 141–151). Buckingham, UK: The Society for Research into Higher Education.
- Becher, T., & Trowler, P. (2001). *Academic tribes and territories* (2nd ed.). Buckingham, UK: The Society for Research in Higher Education.
- Bell, S., Morse, S., & Shah, R. A. (2012). Understanding stakeholder participation in research as part of sustainable development. *Journal of environmental management*, 101, 13–22.
- Benn, S., & Dunphy, D. (2009). Action research as an approach to integrating sustainability into MBA programs. *Journal of Management Education*, 33(3), 276–295.
- Berenguer, J. (2007). The effect of empathy in proenvironmental attitudes and behaviors. *Environment and Behavior*, 39(2), 269.
- Bester, M., & de Graaff, F. (2012). *Curriculum mapping as a responsive and reflective process*. Paper presented at the Higher Education Learning and Teaching Association of Southern Africa 2012, Higher Education Learning and Teaching Association of Southern Africa.
- Biggs, J. (2003a). Aligning teaching and assessing to course objectives. *Teaching and Learning in Higher Education: New Trends and Innovations*, 13–17.
- Biggs, J. (2003b). *Teaching for quality learning at university: What the student does* (2nd ed.). Berkshire, UK: Open University Press and Two Penn Plaza.
- Biggs, J., & Tang, C. (2007a). Outcomes-based teaching and learning (OBTL): What is it, why is it, how do we make it work? Retrieved 12 January, 2009, from http://www.hku.hk/caut/new1/documents/OBTL_what_why_how.pdf
- Biggs, J., & Tang, C. (2007b). *Teaching for quality learning at university: What the student does* (3rd ed.). Berkshire: Open University Press.
- Blackmore, C. (2005). Learning to appreciate learning systems for environmental decision making: A ‘work-in-progress’ perspective. *Systems Research and Behavioural Science*, 22, 329–341.
- Blackmore, P., & Blackwell, R. (2006). Strategic leadership in academic development. *Studies in Higher Education*, 31(03), 373–387.
- Blackmore, P., Chalmers, D., Dearn, J., Frielick, S., Hofgaard Lycke, K., Mason O’Connor, K., ... Trigwell, K. (2004). Academic development: What purpose and whose purpose? In L. Elvidge, K. Fraser, R. Land, C. Mason & B. Matthew (Eds.), *Exploring academic development in higher education: Issues of engagement* (pp. 17–27). Cambridge, UK: Jill Rogers Associates Limited.
- Blewitt, J. (2004). Introduction. In J. Blewitt & C. Cullingford (Eds.), *The sustainability curriculum: The challenge for higher education* (pp. 1–9). London: Earthscan.
- Blewitt, J. (2005). Education for sustainable development, governmentality and Learning to Last. *Environmental Education Research*, 11(2), 173–185.
- Blincoe, K., Fuad-Luke, A., Spangenberg, J. H., Thomson, M., Holmgren, D., Jäschke, K., ... Tylka, K. (2009). DEEDS: A teaching and learning resource to help mainstream sustainability into everyday design teaching and professional practice. *International Journal of Innovation and Sustainable Development*, 4(1), 1–23.
- Boeije, H. (2010). *Analysis in qualitative research*. London: Sage Publications.
- Bosanquet, A., Winchester-Seeto, T., & Rowe, A. (2010). *Changing perceptions underpinning graduate attributes: A pilot study*. Paper presented at the Research and Development in Higher Education: Reshaping Higher Education, Melbourne, Australia.
- Brew, A. (2003). The future of research and scholarship in academic development. In H. Eggins & R. Macdonald (Eds.), *The scholarship of academic development* (pp. 165–181). Buckingham, UK: The Society for Research into Higher Education.
- Budge, K., Clarke, A., & de la Harpe, B. (Eds.). (2007). *Working with conceptions of teaching to underpin lasting change*: HERDSA.

- Burmeister, M., & Eilks, I. (2013). Using participatory action research to develop a course module on Education for Sustainable Development in pre-service chemistry teacher education. *CEPS Journal*, 3(1), 59–78.
- Burns, A. (2005). Action research: An evolving paradigm? *Language Teaching*, 38(02), 57–74.
- Burns, R. (1995). *The adult learner at work*. Sydney, Australia: Business & Professional Publishing.
- Burns, R. B. (2000). *Introduction to research methods* (4th ed.). Sydney, Australia: Pearson Education Australia.
- Cade, A. (2008). Employable graduates for responsible employers. Retrieved March 2, 2008 from <http://www.heacademy.ac.uk/assets/York/documents/ourwork/tla/sustainability/EmployableGraduates2008.pdf>
- Cairns, J. J. (2005). Sustained emergencies. *International Journal of Sustainable Development & World Ecology*, 12, 221–226.
- Carew, A. L., Lefoe, G., Bell, M., & Armour, L. (2008). Elastic practice in academic developers. *International Journal for Academic Development*, 13(1), 51–66.
- Carr, W., & Kemmis, S. (1986). *Becoming critical: Education, knowledge and action research* (2nd ed.). Geelong, Australia: Deakin University.
- Cebrián, G., Grace, M., & Humphris, D. (2013). Organisational learning towards sustainability in higher education. *Sustainability Accounting, Management and Policy Journal*, 4(3), 285–306.
- Centre for Sustainable Futures. (2008). *Sustainability focussed professional support program (PSP)*. Plymouth, UK: Plymouth University.
- Cervero, R. (1992). Professional practice, learning, and continuing education: An integrated perspective. *International Journal of Lifelong Education*, 11(2), 91–101.
- Chau, K. (2007). Incorporation of sustainability concepts into a civil engineering curriculum. *Journal of Professional Issues in Engineering Education and Practice*, 133, 188.
- Cherry, N. (1999). *Action research: A pathway to action, knowledge and learning*. Melbourne, Australia: RMIT University Press.
- Clandinin, D. J., & Connelly, F. M. (2000). *Experience and story in qualitative research*. San Francisco: Jossey-Bass.
- Clegg, K., Rowland, S., Mann, S., Davidson, M., & Clifford, V. (2005). Reconceptualising academic development: Reconciling pleasure and critique in safe places. In L. Elvidge, K. Fraser, R. Land, C. Mason, & B. Matthew (Eds.), *Exploring academic development in higher education: Issues of engagement*. Cambridge, UK: Jill Rogers Associates Limited.
- Clegg, S. (2009). Forms of knowing and academic development practice. *Studies in Higher Education*, 34(4), 403–416.
- Clugston, R. M., & Calder, W. (1999). Critical dimensions of sustainability in higher education. In W. L. Filho (Ed.), *Sustainability and university life*. Frankfurt: Peter Lang.
- Clune, S. (2011). Opportunity not responsibility: Engaging industrial design students in design for sustainability. *Journal of Design Research*, 9(3), 241–253.
- Coates, H. (2008). *Attracting, engaging, retaining. New conversations about learning. Australian student engagement report*. Melbourne, Australia: Australian Council for Educational Research.
- Coghlan, D., & Brannick, T. (2010). *Doing action research in your own organization*. London: Sage Publications.
- Connelly, F. M., & Clandinin, D. J. (1990). Stories of experience and narrative inquiry. *Educational Researcher*, 19(5), 2–14.
- Corcoran, P. B., Calder, W., & Clugston, R. M. (2002). Introduction: Higher education for sustainable development. *Higher Education Policy*, 15(2), 99–103.
- Corcoran, P. B., Walker, K. E., & Wals, A. E. (2004a). Case studies, make-your-case studies, and case stories: A critique of case-study methodology in sustainability in higher education. *Environmental Education Research*, 10(1), 7–21.
- Corcoran, P. B., Walker, K. E., & Wals, A. E. (2004b). Case studies, make-your-case studies, and case stories: A critique of case-study methodology in sustainability in higher education. *Environmental Education Research*, 10(1), 7–21.
- Cotton, D., Bailey, I., Warren, M., & Bissell, S. (2009). Revolutions and second-best solutions: Education for sustainable development in higher education. *Studies in Higher Education*, 34(7), 719–733.

- Cotton, D. R. E., Warren, M. F., Maiboroda, O., & Bailey, I. (2007). Sustainable development, higher education and pedagogy: A study of lecturers' beliefs and attitudes. *Environmental Education Research, 13*(5), 579–597.
- Cowan, J., George, J. W., & Pinheiro-Torres, A. (2004). Alignment of developments in higher education. *Higher Education, 48*, 430–459.
- Cranton, P. (1994). Self-directed and transformative instructional development. *The Journal of Higher Education, 65*(6), 726–744.
- Cranton, P. (2006). *Understanding and promoting transformative learning. A guide for educators of adults* (2nd ed.). San Francisco: Jossey-Bass.
- Cranton, P. (2009). Transformative learning and AVE for social sustainability. In P. Willis, S. McKenzie & R. Harris (Eds.), *Rethinking work and learning: Adult and vocational education for social sustainability* (pp. 93–105). Dordrecht, Netherlands: Springer.
- Cranton, P., & Hoggan, C. (2012). Evaluating transformative learning. In E. W. Taylor & P. Cranton (Eds.), *The handbook of transformative learning: Theory, research, and practice* (pp. 520–535). San Francisco: John Wiley & Sons.
- Cranton, P., & King, K. (2003). Transformative learning as a professional development goal. *New Directions for Adult and Continuing Education, 98*(Summer), 31–37.
- Crawford, K. (2010). Influences on academics' approaches to development: Voices from below. *International Journal for Academic Development, 15*(3), 189–202.
- Creswell, J. W. (2005). *Educational research. Planning, conducting, and evaluating quantitative and qualitative research*. Upper Saddle River, NJ: Pearson Education.
- Crotty, M. (1998). *The foundations of social research. Meaning and perspective in the research process*. Sydney, Australia: Allen & Unwin.
- D'Agostino, F., & O'Brien, M. (2010). *Closing the gap in curriculum development leadership. Final Report*. Sydney, Australia: Australian Learning and Teaching Council.
- D'Andrea, V., & Gosling, D. (2001). Joining the dots. Reconceptualizing educational development. *Active Learning in Higher Education, 2*(1), 64–80.
- Dale, A., & Newman, L. (2005). Sustainable development, education and literacy. *International Journal of Sustainability in Higher Education, 6*(4), 351–362.
- Dall'Alba, G. (2004). Understanding professional practice: Investigations before and after an educational programme. *Studies in Higher Education, 29*(6), 679–692.
- Dall'Alba, G., & Barnacle, R. (2007). An ontological turn for higher education. *Studies in Higher Education, 32*(6), 679–691.
- Dawe, G., Jucker, R., & Martin, S. (2005). *Sustainable development in higher education: Current practice and future developments*. York, UK: Higher Education Academy.
- Day, C. (1993). Reflection: A necessary but not sufficient condition for professional development. *British Educational Research Journal, 19*(1), 83–93.
- de la Harpe, B., Radloff, A., Dalton, H., Thomas, J., David, C., Scoufis, M., et al. (2009). *The B factor project. Understanding academic staff beliefs about graduate attributes. Final report 2009*. Australian Learning and Teaching Council.
- de la Harpe, B., & Thomas, I. (2009). Curriculum change in universities: Conditions that facilitate education for sustainable development. *Journal of Education for Sustainable Development, 3*(1), 11.
- de la Harpe, B., & Wahr, F. (2010). *Sustainability learning and teaching at RMIT: A report on the 2010 sustainability presences in undergraduate and VET programs*. Melbourne, Australia: RMIT University Sustainability Committee, RMIT University.
- Denzin, N. K., & Lincoln, Y. S. (2011). *The Sage handbook of qualitative research* (4th ed.). Thousand Oaks, CA: Sage.
- Department of the Environment, Water, Heritage and the Arts. (2009). *Living sustainably. The Australian Government's national action plan for education for sustainability*. Canberra, Australia: Commonwealth of Australia.
- Department of the Environment, Water, Heritage and the Arts. (2010). *Sustainability Curriculum Framework. A guide for curriculum developers and policy makers*. Canberra: Commonwealth of Australia.
- Desha, C. J., & Hargroves, K. (2014). *Higher education and sustainable development. A model for curriculum renewal*. Abingdon, Oxon: Routledge.

- Dick, B. (1993). You want to do an action research thesis? Retrieved August 7, 2006, from <http://www.scu.edu.au/schools/gcm/ar/art/arthesis.html>
- Dick, B. (1996). Managing change. Retrieved November 21, 2014, from <http://www.aral.com.au/resources/change.html>
- Dirkx, J. M. (2006). Engaging emotions in adult learning: A Jungian perspective on emotion and transformative learning. *New directions for adult and continuing education*, 2006(109), 15–26.
- Domask, J. (2007). Achieving goals in higher education: An experiential approach to sustainability studies. *International Journal of Sustainability in Higher Education*, 8(1), 53–68.
- Draper, F. J. (2012). *Development of a student-centred evaluation framework for environmental vocational education and training courses: Development and validation of a student-centred evaluation framework for environmental vocational education and training courses derived from Biggs' 3P Model and Kirkpatrick's Four Levels Evaluation Model*. University of Bradford.
- Duke, R., & Kelly, O. (2013). *Experiences and lessons from teaching education for sustainability*. Paper presented at the Meeting the Challenges of a Globalised World, Dublin.
- Dunphy, D., Griffiths, A., & Benn, S. (2003). *Organizational Change for Corporate Sustainability* (First ed.). London: Routledge.
- Dyer, A., Selby, D., & Chalkley, B. (2006). A centre for excellence in education for sustainable development. *Journal of Geography in Higher Education*, 30(2), 307–312.
- Eckel, P., & Kezar, A. (2003). Key strategies for making new institutional sense: Ingredients to higher education transformation. *Higher Education Policy*, 16, pp. 39–53.
- Eisen, A., & Barlett, P. (2006). The Piedmont Project: Fostering faculty development toward sustainability. *The Journal of Environmental Education*, 38(1), 25–36.
- Eley, M. (2006). Teachers' conceptions of teaching, and the making of specific decisions in planning to teach. *Higher Education*, 51(2), 191–214.
- Elton, L. (2003). Dissemination of innovations in higher education: A change theory approach. *Tertiary Education and Management*, 9(3), 199–214.
- Elton, L. (2006). Academic professionalism: The need for change. In C. Bryan & K. Clegg (Eds.), *Innovative assessment in higher education* (pp. 209–215). Abingdon, Oxon, UK: Routledge.
- Engineers Australia. (2008). Accreditation criteria summary S02, *Accreditation management system education programs at the level of professional engineer*. Canberra, Australia: Engineers Australia.
- Environment Australia. (2000). *Environmental education for a sustainable future. National action plan*. Canberra, Australia: Commonwealth of Australia.
- Ferman, T. (2002). Academic professional development practice: What lecturers find valuable. *International Journal for Academic Development*, 7(2), 146–158.
- Ferreira, J.-A., Ryan, L., & Tilbury, D. (2007). Mainstreaming education for sustainable development in initial teacher education in Australia: A review of existing professional development models. *Journal of Education for Teaching*, 33, 225–239.
- Ferreira, J., Ryan, L., Davis, J., Cavanagh, M., & Thomas, J. (2009). *Mainstreaming sustainability into pre-service teacher education in Australia*. Canberra, Australia: Australian Research Institute in Education for Sustainability, Macquarie University.
- Ferrer-Balas, D., Adachi, J., Banas, S., Davidson, C. I., Hoshikoshi, A., Mishra, A., ... Ostwald, M. (2008). An international comparative analysis of sustainability transformation across seven universities. *International Journal of Sustainability in Higher Education*, 9(3), 295–316.
- Fien, J. (2001). The learning for a sustainable environment project: A case study of an action research network for teacher education. *Australian Journal of Environmental Education*, 77(86), 17.
- Fien, J., & Hillcoat, J. (1996). The critical tradition in research in geographical and environmental education research. In M. Williams (Ed.), *Understanding geographical and environmental education: The role of research* (pp. 26–40). London: Cassell.
- Fien, J., & Tilbury, D. (2002). The global challenges of sustainability. In D. Tilbury, R. B. Stevenson, J. Fien & D. Schreuder (Eds.), *Education and sustainability: Responding to the global challenge* (pp. 1–12). Gland, Switzerland and Cambridge: IUCN, The World Conservation Union.

- Fisher, R. J. (1993). Social desirability bias and the validity of indirect questioning. *Journal of Consumer Research*, 303–315.
- Fleiss, J. L., Levin, B., & Paik, M. C. (2004). The measurement of interrater agreement *Statistical Methods for Rates and Proportions* (3rd ed., pp. 598–626). Hoboken, NJ: John Wiley & Sons.
- Fletcher, K. (2008). *Sustainable fashion and textiles: Design Journeys*. London: Earthscan.
- Fletcher, M. A., & Zuber-Skerritt, O. (2008). Professional development through action research: Case examples in South African higher education. *Systemic Practice and Action Research*, 21(1), 73–96.
- Franz-Balsen, A., & Heinrichs, H. (2007). Managing sustainability communication on campus: Experiences from Lüneburg. *International Journal of Sustainability in Higher Education*, 8(4), 431–445.
- Franz, T. (2012). *Group dynamics and team interventions*. Chichester, UK: WileyBlackwell.
- Fraser, B. J., Nash, R., & Fisher, D. L. (1983). Anxiety in science classrooms: Its measurement and relationship to classroom environment. *Research in Science & Technological Education*, 1(2), 201–208.
- Fraser, S. P. (2006). Shaping the university curriculum through partnerships and critical conversations. *International Journal for Academic Development*, 11(1), 5–17.
- Fraser, S. P., & Bosanquet, A. M. (2006). The curriculum? That's just a unit outline, isn't it? *Studies in Higher Education*, 31(3), 269–284.
- Fredriksson, P., & Persson, M. (2011). Integrating sustainable development into operations management courses. *International Journal of Sustainability in Higher Education*, 12(3), 236–249.
- Fry, H., Hewes, I., Kiley, M., Marincovich, M., Meyer, J. H. F., Pearson, M., et al. (2005). Conceptual frameworks in action. In L. Elvidge, K. Fraser, R. Land, C. Mason, & B. Matthew (Eds.), *Exploring academic development in higher education: Issues of engagement* (pp. 59–70). Cambridge, UK: Jill Rogers Associates Limited.
- Fullan, M. (2001). *The new meaning of educational change* (3rd ed.). New York and London: Teachers College Press and RoutledgeFalmer.
- Gallagher, S. (1992). *Hermeneutics and education*. Albany, New York: State University of New York Press.
- Gerber, R. (1996). Interpretive approaches to geographical and environmental education research. In M. Williams (Ed.), *Understanding geographical and environmental education: The role of research*. London: Cassell.
- Gibbs, A. (2001). Social work and empowerment-based research: Possibilities, process and questions. *Australian Social Work*, 54(1), 29–39.
- Glasser, H. (2004). Learning our way to a sustainable and desirable world. In P. B. Corcoran & A. E. J. Wals (Eds.), *Higher Education and the Challenge of Sustainability: Problematics, Promise and Practice* (pp. 131–148). Dordrecht: Kluwer Academic Publishers.
- Gosling, D. (2003). Philosophical approaches to academic development. In H. Eiggins & R. Macdonald (Eds.), *The scholarship of academic development*. Buckingham, UK: The Society for Research in Higher Education and the Open University Press.
- Gough, S., & Scott, W. (2007). *Higher education and sustainable development. Paradox and possibility*. Abingdon, Oxon, UK: Routledge.
- Grace, S., Smith, B., Bradford, M., & Elvidge, L. (2004). Maximising the synergy: Disciplinary and generic approaches in academic staff development. In L. Elvidge, K. Fraser, R. Land, C. Mason & B. Matthew (Eds.), *Exploring academic development in higher education: Issues of engagement*. Cambridge, UK: Jill Rogers Associates Limited.
- Gravett, S. (2004). Action research and transformative learning in teaching development. *Educational Action Research*, 12(2), 259–272.
- Greenwood, D., & Levin, M. (2008). Reform of the social sciences and of universities through action research. In N. Denzin & Lincoln. Y. (Eds.), *The landscape of qualitative research* (3rd ed., pp. 57–86). Thousand Oaks, CA: Sage Publications.
- Griffiths, M., & Tann, S. (1992). Using reflective practice to link personal and public theories. *British Journal of Teacher Education*, 18(1), 69–84.
- Hadgraft, R., Muir, P., Jollands, M., Goricanec, J., Brown, A., & Bunting, A. (2004). Shifting the ground – Sustainable engineering at RMIT. In S. Holdsworth & T. Caswell (Eds.), *Protecting*

- the future: Stories of Sustainability from RMIT University* (pp. 31–51). Melbourne, Australia: CSIRO Publishing.
- Hall, R. (2003). Forging a Learning Community? *Arts and Humanities in Higher Education*, 2(2), 155.
- Harland, T. (2003). Vygotsky's zone of proximal development and problem-based learning: Linking a theoretical concept with practice through action research. *Teaching in Higher Education*, 8(2), 263–272.
- Harland, T., & Staniforth, D. (2000). Action research: A culturally acceptable path to professional learning for university teachers? *Educational Action Research*, 8(3), 499–514.
- Harland, T., & Staniforth, D. (2003). Academic development as academic work. *International Journal for Academic Development*, 8(1/2), 25–35.
- Harris, L., Driscoll, P., Lewis, M., Matthews, L., Russell, C., & Cumming, S. (2010). Implementing curriculum evaluation: Case study of a generic undergraduate degree in health sciences. *Assessment & Evaluation in Higher Education*, 35(4), 477–490.
- Hart, G. (2003). *RMIT Teaching and Learning Strategy 2003–2006*. Melbourne, Australia: RMIT University.
- Haskell, R. E. (2001). *Transfer of learning. Cognition, instruction and reasoning*. San Diego, CA: Academic Press.
- Hayes, D. (2001). Reflections on the meaning of “non-participation” in research. *Research in Education*(May), 20–30.
- Hayles, C. S., & Holdsworth, S. E. (2008). Curriculum change for sustainability. *Journal for Education in the Built Environment*, 3(1), 25–48.
- Hazelton, J., & Haigh, M. (2008). Incorporating Sustainability into Accounting Curricula: Lessons Learnt From an Action Research Study. *Accounting Education, iFirst*, 1–20.
- Healey, M., & Jenkins, A. (2003). Discipline-based educational development. In H. Eggins & R. Macdonald (Eds.), *The scholarship of academic development* (pp. 47–57). Buckingham, UK: The Society for Research into Higher Education and Open University Press.
- Hegarty, K., Thomas, I., Kriewaldt, C., Holdsworth, S., & Bekessy, S. (2011). Insights into the value of a “stand-alone” course for sustainability education. *Environmental Education Research*, 17(4), 451–469.
- Hicks, M. (2005). Academic developers as change agents: Caught in the middle. *Higher Education in a changing world. Research and Development in Higher Education*, 28, 175–182.
- Hiller Connell, K. Y., & Kozar, J. M. (2012). Sustainability knowledge and behaviors of apparel and textile undergraduates. *International Journal of Sustainability in Higher Education*, 13(4), 394–407.
- Hinton, T., Gannaway, D., Berry, B., & Moore, K. (2011). *The D-Cubed Guide: Planning for effective dissemination*. Sydney, Australia: Australian Teaching and Learning Council.
- Hodder, I. (2003). The interpretation of documents and material culture. In N. Denzin & Y. Lincoln (Eds.), *Collecting and interpreting qualitative materials* (2nd ed., pp. 155–175). Thousand Oaks, CA: Sage.
- Holdsworth, S., Bekessy, S., Mnguni, P., Hayles, C., & Thomas, I. (2006). Beyond leather patches (BELP): Sustainability education at RMIT University. In W. L. Filho & D. Carpenter (Eds.), *Sustainability in the Australasian University Context* (pp. 107–128). Frankfurt: Peter Lang.
- Holdsworth, S., Bekessy, S., & Thomas, I. (2009). Evaluation of curriculum change at RMIT: Experiences of the BELP project. *Reflecting Education*, 5(1), 51–72.
- Holdsworth, S., & Caswell, T. (Eds.). (2004). *Protecting the future: Stories of sustainability from RMIT*. Melbourne, Australia: RMIT University.
- Holdsworth, S., Wyborn, C., Bekessy, S., & Thomas, I. (2008). Professional development for education for sustainability. How advanced are Australian universities? *International Journal for Sustainability in Higher Education*, 9(2), 131–146.
- Holmberg, J., Svanströma, M., Peetb, D. J., Mulderb, K., Ferrer-Balas, D., & Segalàsc, J. (2008). Embedding sustainability in higher education through interaction with lecturers: Case studies from three European technical universities. *European Journal of Engineering Education*, 33(3), 271–282.
- Hopkins, C., & McKeown, R. (2002). Education for sustainable development: An international perspective. In D. Tilbury, R. B. Stevenson, J. Fien, & D. Schreuder (Eds.), *Education and*

- sustainability: Responding to the global challenge* (pp. 13–24). Gland, Switzerland & Cambridge: IUCN, The World Conservation Union.
- Hopkinson, P., Hughes, P., & Layer, G. (2008). Sustainable graduates: Linking formal, informal and campus curricula to embed education for sustainable development in the student learning experience. *Environmental Education Research*, 14(4), 435–454.
- Hubball, H., & Burt, H. (2004). An integrated approach to developing and implementing learning-centred curricula. *International Journal for Academic Development*, 9(1), 51–65.
- Hubball, H., & Gold, N. (2007). The scholarship of curriculum practice and undergraduate program reform: Integrating theory into practice. *New Directions for Teaching and Learning*, 2007(112), 5–14.
- Hubball, H., Gold, N., Mighty, J., & Britnell, J. (2007). Supporting the implementation of externally generated learning outcomes and learning-centred curriculum development: An integrated framework. *New Directions for Teaching and Learning*, (112), 93–105.
- Huckle, J. (2004). Critical realism: A philosophical framework for higher education for sustainability. In P. B. Corcoran & A. E. J. Wals (Eds.), *Higher education and the challenge of sustainability* (pp. 33–47). Dordrecht: Kluwer Academic Publishers.
- Hughes, C., & Barrie, S. (2010). Influences on the assessment of graduate attributes in higher education. *Assessment & Evaluation in Higher Education*, 35(3), 325–334.
- Institute for Teaching & Learning. (2008, 2012). Graduate attributes statement database, graduate attribute map. Retrieved 9 January, 2014, from <http://www.itl.usyd.edu.au/projects/nationalgap/resources/gamap/map.cfm?ga=4#hd9727>
- Intergovernmental Panel on Climate Change. (2014). *Climate Change 2014, Synthesis Report*. Geneva: Intergovernmental Panel on Climate Change,.
- Iverson, K. (2008). Engaging the e-learner: Interaction is not education. *Learning Solutions* (February 25), 1–7.
- Ives, C., McAlpine, L., & Gandell, T. (2009). A systematic approach to evaluating teaching and learning initiatives in post-secondary education. *Canadian Journal of Higher Education*, 39(2), 45–76.
- James Cook University. (2014). Sustainability at JCU. Retrieved 9 June, 2014, from <http://www.jcu.edu.au/about/campuses/index.htm>
- Jarvie, I. (1969). The problem of ethical integrity in participant observation. *Current Anthropology*, 10(5), 505–508.
- Jickling, B. (1997). If environmental education is to make sense to teachers, we had better rethink how we define it! *Canadian Journal of Environmental Education*, 2(Spring), 86–103.
- Johnson -Bailey, J. (2012). Positionality and transformative learning. A tale of inclusion and exculsion. In E. W. Taylor & P. Cranton (Eds.), *The handbook of transformative learning: Theory, research, and practice* (pp. 260–273). San Francisco: John Wiley & Sons.
- Jones, P., Selby, D., & Sterling, S. (2010). More than the sum of their parts? Interdisciplinarity and sustainability. In P. Jones, D. Selby & S. Sterling (Eds.), *Sustainability education: Perspectives and practice across higher education* (pp. 17–37). Abingdon, Oxon: Earthscan.
- Jones, P., Trier, C. J., & Richards, J. P. (2008). Embedding education for sustainable development in higher education: A case study examining common challenges and opportunities for undergraduate programmes. *International Journal of Educational Research*, 47(6), 341–350.
- Joseph, P. (2010). Holistic curriculum. In C. Kridel (Ed.), *Encyclopedia of curriculum studies*. (pp. 446–448). Thousand Oaks, CA: Sage Publications.
- Kagawa, F. (2007). Dissonance in students' perceptions of sustainable development and sustainability. *International Journal of Sustainability in Higher Education*, 8(3), 317–338.
- Karatzoglou, B. (2013). An in-depth literature review of the evolving roles and contributions of universities to education for sustainable development. *Journal of Cleaner Production*, 49, 44–53.
- Kasworm, C., & Bowles, T. (2012). Fostering transformative learning in higher education settings. In E. W. Taylor & P. Cranton (Eds.), *The handbook of transformative learning: Theory, research, and practice* (pp. 388–407). San Francisco: John Wiley & Sons.
- Kember, D. (2000). *Action learning and action research. Improving the quality of teaching and learning*. London: Kogan Page.

- Kember, D. (2002). Long-term outcomes of educational action research projects. *Educational Action Research, 10*(1), 83–104.
- Kember, D., & Kwan, K. (2000). Lecturers' approaches to teaching and their relationship to conceptions of good teaching. *Instructional Science, 28*, 469–490.
- Kemmis, S., & McTaggart, R. (2008). Participatory action research: Communicative action and the public sphere. In N. Denzin & Y. Lincoln (Eds.), *Strategies of qualitative inquiry* (3rd ed., pp. 269–330). Thousand Oaks, CA: Sage Publications.
- Kemmis, S., McTaggart, R., & Nixon, R. (2014a). *The Action Research Planner: Doing critical participatory action research*. Singapore: Springer Singapore.
- Kezar, A. (2001). Understanding and facilitating organizational change in the 21st century. *ASHE-Eric Higher Education Report, 28*(4), 1–162.
- Kincheloe, J. L., & McLaren, P. (2002). Rethinking critical theory and qualitative research. In Y Zou & H. Trueba (Eds.), *Ethnography and Schools: Qualitative approaches to the study of education* (pp. 87–138), Lanham, MD: Rowman & Littlefield.
- King, M. F., & Bruner, G. C. (2000). Social desirability bias: A neglected aspect of validity testing. *Psychology & Marketing, 17*(2), 79–103.
- Kirk, D., & MacDonald, D. (2001). Teacher voice and ownership of curriculum change. *Journal of Curriculum Studies, 33*(5), 551–567.
- Kirk, P., & Broussine, M. (2000). The politics of facilitation. *Journal of workplace learning, 12*(1), 13–22.
- Kirkpatrick, D., & Kirkpatrick, J. (2006). *Evaluating training programs: The four levels* (3rd ed.). San Francisco: Berrett-Koehler Publishers, Inc.
- Kirkpatrick, J., & Kirkpatrick, W. (2013). Creating a post training evaluation plan. *T+D, June*, 26–28.
- Knight, P. T. (2001). Complexity and curriculum: A process approach to curriculum-making. *Teaching in Higher Education, 6*(3), 369–381.
- Knight, P. T., & Trowler, P. (2000). Department-level culture and the improvement of learning and teaching. *Studies in Higher Education, 25*(1), 69–83.
- Kotter, J. (1995). Leading change: Why transformation efforts fail. *Harvard Business Review, March-April*.
- Kotter, J. (2001). What leaders really do. *Harvard Business Review, 79*(11).
- Kreber, C. (2004). An analysis of two models of reflection and their implications for educational development. *International Journal for Academic Development, 9*(1), 29–49.
- Kreber, C., & Brook, P. (2001). Impact evaluation of educational development programmes. *International Journal of Academic Development, 6*(2), 96–108.
- Kroll, L. (2004). Constructing constructivism: How student-teachers construct ideas of development, knowledge, learning and teaching. *Teachers and teaching: theory and practice, 10*(2), 199–221.
- Kvale, S. (2007). *Doing interviews* (Vol. 2). London: SAGE Publications Limited.
- Land, R. (2001). Agency, context and change in academic development. *The International Journal for Academic Development, 6*(1), 3–20.
- Land, R. (2003). Orientations to academic development. In H. Eggins & R. Macdonald (Eds.), *The scholarship of academic development* (pp. 34–46). Buckingham, UK: The Society for Research into Higher Education and the Open University Press.
- Lang, J. R., Thomas, I., & Wilson, A. (2006). Education for sustainability in Australian universities: Where is the action? *Australian Journal of Environmental Education, 22*(2), 45–58.
- Lavrakas, P. J. (Ed.). (2008). *Encyclopedia of Survey Research Methods*. Thousand Oaks, CA: Sage Publications.
- Leal Filho, W. (2000). Dealing with misconceptions on the concept of sustainability. *International Journal of Sustainability in Higher Education, 1*(1), 9–19.
- Leal Filho, W. (2011a). About the Role of Universities and Their Contribution to Sustainable Development. *Higher Education Policy, 24*(4), 427–438.
- Leal Filho, W. (2011b). Applied sustainable development: A way forward in promoting sustainable development in higher education institutions. *World Trends on Education for Sustainable Development, Frankfurt: Peter Lang Scientific Publishers*.
- Lee, A., & McWilliam, E. (2008). What game are we in? Living with academic development. *International Journal for Academic Development, 13*(1), 67–77.

- Lee, K.-H., Barker, M., & Mouasher, A. (2013). Is it even espoused? An exploratory study of commitment to sustainability as evidenced in vision, mission, and graduate attribute statements in Australian universities. *Journal of Cleaner Production*, *48*, 20–28.
- Levin, M. (2012). Academic integrity in action research. *Action Research*, *10*(2), 133–149.
- Liddell, M. (2002). Identifying research themes through progressive analysis: A case study approach. In P. Green (Ed.), *Slices of life: Qualitative research snapshots* (pp. 59–71). Melbourne: RMIT Publishing.
- Liddy, M. (2012). From marginality to the mainstream: Learning from action research for sustainable development. *Irish Educational Studies*, *31*(2), 139–155.
- Lincoln, Y. (1998). From understandings to action: New imperatives, new criteria, new methods for interpretive researchers. *Theory and research in social education*, *26*(1), 12–29.
- Lincoln, Y., & Guba, E. (1985). *Naturalistic Inquiry*. Beverly Hills, CA: Sage Publications.
- Lines, R. (2005). *Discourse and power: A study of change in the managerialised university in Australia*. Unpublished PhD., RMIT University, Melbourne.
- Littledyke, M., Manolas, E., & Littledyke, R. A. (2013). A systems approach to education for sustainability in higher education. *International Journal of Sustainability in Higher Education*, *14*(4), 367–383.
- Lodico, M. G., Spaulding, D. T., & Voegtler, K. H. (2010). *Methods in educational research: From theory to practice*. San Francisco: Wiley.
- Lotz-Sisitka, H., Lupele, J., & Ogbuigwe, A. (2007). Translation processes in the design of an education for sustainable development innovations course for universities in Africa. *Journal of Education for Teaching*, *33*(2), 157–175.
- Lourdelle, N., Gondran, N., Laforest, V., Debray, B., & Brodhag, C. (2007). Sustainable development cognitive map: A new method of evaluating student understanding. *International Journal of Sustainability in Higher Education*, *8*(2), 170–182.
- Lozano-García, F. J., Huisinigh, D., & Delgado-Fabián, M. (2009). An interconnected approach to incorporate sustainable development at Tecnológico de Monterrey. *International Journal of Sustainability in Higher Education*, *10*(4), 318–333.
- Lozano, F. J., & Lozano, R. (2014). Developing the curriculum for a new bachelor's degree in engineering for sustainable development. *Journal of Cleaner Production*, *64*, 136–146.
- Lozano, R. (2006). Incorporation and institutionalization of SD into universities: Breaking through barriers to change. *Journal of Cleaner Production*, *14*(9), 787–796.
- Lozano, R. (2010). Diffusion of sustainable development in universities' curricula: An empirical example from Cardiff University. *Journal of Cleaner Production*, *18*(7), 637–644.
- Lozano, R., Lukman, R., Lozano, F. J., Huisinigh, D., & Lambrechts, W. (2013). Declarations for sustainability in higher education: Becoming better leaders, through addressing the university system. *Journal of Cleaner Production*, *48*, 10–19.
- Lueddeke, G. R. (1999). Toward a constructivist framework for guiding change and innovation in higher education. *Journal of Higher Education*, *70*(3), 235–260.
- Macdonald, R. (2003). Developing a scholarship of academic development: Setting the context. In H. Eggins & R. Macdonald (Eds.), *The scholarship of academic development* (pp. 1–10). Buckingham, UK: The Society for Research into Higher Education and Open University Press.
- MacVaugh, J., & Norton, M. (2012). Introducing sustainability into business education contexts using active learning. *International Journal of Sustainability in Higher Education*, *13*(1), 72–87.
- Manathunga, C. (2006). Doing educational development ambivalently: Applying post-colonial metaphors to educational development? *International Journal for Academic Development*, *11*(1), 19–29.
- Martin, E., & Leuckenhansen, G. (2005). How university teaching changes teachers: Affective as well as cognitive challenges. *Higher Education*, *49*, 389–412.
- Mason, R. (2005). Art teachers and action research. *Educational Action Research*, *13*(4), 563–580.
- Mattsson, M., & Kemmis, S. (2007). Praxis-related research: Serving two masters? *Pedagogy, Culture & Society*, *15*(2), 185–214.
- May, T. (1997). *Social research: issues, methods and process* (2nd ed.). Buckingham: Open University Press.

- McGonigal, K. (2005). Teaching for transformation: From learning theory to teaching strategies. *Speaking of Teaching*, 14(2).
- McMillin, J., & Dyball, R. (2009). Developing a whole-of-university approach to educating for sustainability linking curriculum, research and sustainable campus operations. *Journal of Education for Sustainable Development*, 3(1), 55–64.
- McNiff, J., Lomax, P., & Whitehead, J. (1996). *You and your action research project* (3rd ed.). New York: Routledge.
- McNiff, J., & Whitehead, J. (2010). *You and your action research project* (3rd ed.). New York: Routledge.
- Meyers, R. (2006). Environmental learning: Reflections on practice, research and theory. *Environmental Education Research*, 12(3–4), 459–470.
- Mezirow, J. (1990). How critical reflection triggers transformative learning. In J. Mezirow (Ed.), *Fostering critical reflection in adulthood* (pp. 1–18). San Francisco: Jossey-Bass.
- Mezirow, J. (1991). *Transformative dimensions of adult learning*. San Francisco: Jossey-Bass Inc.
- Mezirow, J. (2002). Transformative learning: Theory to practice. *New Directions for Adult and Continuing Education*, (74), 5–12.
- Michalos, A. C., Creech, H., McDonald, C., & Kahlke, P. M. H. (2009). *Measuring knowledge, attitudes and behaviours towards sustainable development: Two exploratory studies*. Manitoba: International Institute for Sustainable.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded source book* (2nd ed.). Thousand Oaks, California: Sage.
- Millennium Ecosystem Assessment Board. (2005). *Living beyond our means. Natural assets and human well-being. Statement from the Board*. Paris: United Nations Environment Program.
- Miller, J. P. (2007). *The Holistic Curriculum*: University of Toronto Press, Scholarly Publishing Division.
- Minichiello, V., Aroni, R., Timewell, E., & Alexanders, L. (1995). *In-depth interviewing* (2nd ed.). Frenchs Forest, Sydney: Pearson Education Australia P/L.
- Mnguni, P., & Long, S. (2006). Partnering for sustainability: A task not for the faint-hearted. In W. L. Filho & D. Carpenter (Eds.), *Sustainability in the Australasian university context*. Frankfurt: Peter Lang.
- Mochizuki, Y., & Fadeeva, Z. (2010). Competences for sustainable development and sustainability: significance and challenges for ESD. *International Journal of Sustainability in Higher Education*, 11(4), 391–403.
- Moon, J. A. (1999). *Reflection in learning and professional development*. London: Kogan Page.
- Moon, J. A. (2004). *A handbook of reflective and experiential learning. Theory and practice*. London: RoutledgeFalmer.
- Moore, J. (2005). Seven recommendations for creating sustainability education at the university level. *International Journal of Sustainability in Higher Education*, 6(4), 326–339.
- Moore, J. L. (2004). *Recreating the university from within: Sustainability and transformation in higher education*. Unpublished PhD thesis, University of British Columbia.
- Morgan, C., & Roberts, D. (2002, July). *Herding cats? Obtaining staff support for curriculum change and implementation*. Paper presented at the Spheres of influence: Venture and visions in educational development. 4th World Conference of the International Consortium for Educational Development, Perth, Australia.
- Morris, C., & Fry, H. (2006). Enhancing educational research and development activity through small grants schemes: A case study. *International Journal for Academic Development*, 11(1), 43–56.
- Mulder, K. (2007). Don't preach. Practice! The acceptability of normative statement in academic sustainability education. In W. Leal Filho, E. Manolas, M. Sotirakou & G. Boutakis (Eds.), *Higher education and the challenge of sustainability: Problems, promises and good practice*. (pp. 155–166). Soufli, Greece: Environmental Education Centre of Soufli.
- Nederhof, A. J. (1985). Methods of coping with social desirability bias: A review. *European Journal of Social Psychology*, 15(3), 263–280.
- Neumann, R., Parry, S., & Becher, T. (2002). Teaching and learning in their disciplinary contexts: A conceptual analysis. *Studies in Higher Education*, 27(4), 405–417.

- Nir, A. E., & Bogler, R. (2008). The antecedents of teacher satisfaction with professional development programs. *Teaching and Teacher Education*, 24(2), 377–386.
- Norton, L., Richardson, J. T. E., Hartley, J., Newstead, S., & Mayes, J. (2005). Teachers' beliefs and intentions concerning teaching in higher education. *Higher Education*(50), 537–571.
- Olsen, M., Lodwick, D., & Dunlap, R. (1992). Theoretical framework: Worldviews and their components *Viewing the world ecologically* (pp. 13–32). Boulder, CO: Westview Press.
- Pajares, M. F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research*, 62(3), 307–332.
- Paulus, P. B., Kohn, N., & Dzindolet, M. (2011). Teams. In M. A. Runco & S. R. Pritzker (Eds.), *Encyclopedia of creativity* (pp. 466–452). London: Elsevier Inc.
- Pearson, S., Honeywood, S., & O'Toole, M. (2005). Not yet learning for sustainability: The challenge of environmental education in a university. *International Research in Geographical and Environmental Education*, 14(3), 173–186.
- Peseta, T., & Manathunga, C. (2007). The anxiety of making academics over: Resistance and responsibility in academic development. In I. Morley (Ed.), *The value of knowledge* (pp. 165–179): Interdisciplinary Press.
- Polly, D., & Hannafin, M. J. (2011). Examining how learner-centered professional development influences teachers' espoused and enacted practices. *The Journal of Educational Research*, 104(2), 120–130.
- Precision Consulting. (2007). *Graduate employability skills*. Canberra: Commonwealth of Australia.
- Priestley, M. (2011). Schools, teachers, and curriculum change: A balancing act? *Journal of Educational Change*, 12(1), 1–23.
- Qablan, A. M., Al-Ruz, J. A., Khasawneh, S., & Al-Omari, A. (2009). Education for sustainable development: Liberation or indoctrination? An assessment of faculty members' attitudes and classroom practices. *International Journal of Environmental & Science Education*, 3(3), 401–417.
- Radloff, A., de la Harpe, B., Dalton, H., Thomas, J., & Lawson, A. (2008). Assessing graduate attributes: Engaging academic staff and their students. *ATN Assessment*, 1(1).
- Radloff, A., de la Harpe, B., & Wright, L. (2001). A strategic approach to helping university teachers to foster student self-directed learning. In C. Rust (Ed.), *Improving student learning. Improving student learning strategically. Proceedings from the 2000 8th International Symposium* (pp. 262–270). Oxford: The Oxford Centre for Staff and Learning Development.
- Ramsden, P. (1992). *Learning to teach in higher education*. London: Routledge.
- Randers, J. (2000). From limits of growth to sustainable development or SD (sustainable development) in a SD (system dynamics) perspective. *System Dynamics Review*, 16(3), 213–224.
- Reason, P. (1988). Introduction. In P. Reason (Ed.), *Human inquiry in action: Development in new paradigm research* (pp. 1–17). London: Sage Publications.
- Reason, P. (2006). Choice and quality in action research practice. *Journal of Management Inquiry*, 15(2), 187–203.
- Reason, P., & Bradbury, H. (2008). Participatory action research as practice. In P. Reason & H. Bradbury (Eds.), *The SAGE handbook of action research: Participative inquiry and practice* (2nd ed., pp. 1–16). London: Sage Publications.
- Reder, M. (2007). Does your college really support teaching and learning? *Peer Review*, 9(4), www.aacu.org/peerreview/pr-fa07/pr-fa07_TeachLearn.cfm sourced 16/03/08.
- Reid, A. (2002). *Is there an "ideal" approach for academic development*. Paper presented at the 4th World Conference of the International Consortium for Educational Development, Perth, Australia.
- Reid, A., & Petocz, P. (2003). Enhancing academic work through the synergy between teaching and research. *International Journal for Academic Development*, 8(1 & 2), 105–117.
- Reid, A., & Petocz, P. (2006). University lecturers' understanding of sustainability. *Higher Education: The International Journal of Higher Education and Educational Planning*, 51(1), 105–123.
- RMIT University. (2010). *Sustainability Action Plan*. Melbourne: RMIT University.

- RMIT University. (2012a). Policies and procedures: Program approval of HE coursework programs - guidelines. Retrieved August 8, 2012, from <http://www.rmit.edu.au/browse;ID=dmrv7tywmgg6z>
- RMIT University. (2012b). RMIT sustainability policy. Retrieved 28 May, 2014, from http://www.rmit.edu.au/browse;ID=wf9xrxnule7c1;STATUS=A;SECTION=3;PAGE_AUTHOR=Property%20Services
- RMIT University. (2013a). *Future Changers. Learning and Teaching for Sustainability Resource Toolkit and Templates*. Melbourne: RMIT University.
- RMIT University. (2013b). *RMIT Programs and Courses with Sustainability foci*. Melbourne: RMIT University.
- RMIT University. (nd-a). Graduate attributes; environmentally aware and responsible. Retrieved 29 May, 2014, from <http://rmit.net.au/browse;ID=esi2ehsc1kv>
- RMIT University. (nd-b). Learning and teaching; sustainability governance. Retrieved 28 May, 2014, from <http://www.rmit.edu.au/browse/Staff%2FLearning%20and%20Teaching%2FPriorities%2FSustainability%2FGovernance%20and%20initiatives/>
- Roberts, C., & Roberts, J. (2007). Greener by degrees? In C. Roberts & J. Roberts (Eds.), *Greener by degrees: Exploring sustainability through higher education curricula* (pp. 1–9). Cheltenham, Gloucestershire: Geography Discipline Network, University of Gloucestershire.
- Robottom, I., & Hart, P. (1993). *Research in environmental education: Engaging the debate*. Geelong, Victoria: Deakin University.
- Robson, C. (2002). *Real world research: A resource for social scientists and practitioner-researchers*. Oxford: Blackwell Publishers Ltd.
- Rowe, D. (2002). Environmental literacy and sustainability as core requirements: Success stories and models. In W. L. Filho (Ed.), *Teaching sustainability at universities* (pp. 79–103). New York: Peter Lang.
- Rowland, S. (2003). Academic development: A practical or theoretical business? In H. Eggins & R. Macdonald (Eds.), *The scholarship of academic development* (pp. 13–22). Buckingham, UK: The Society for Research into Higher Education and Open University Press.
- Roy, D., Borin, P., & Kustra, E. (2007). Assisting curriculum change through departmental initiatives. *New Directions for Teaching and Learning*, (112), 21–32.
- Ruff, C., & Olson, M. (2009). The attitudes of interior design students towards sustainability. *International Journal of Technology and Design Education*, 19, 67–77.
- Ryan, A., & Tilbury, D. (2013). Uncharted waters: Voyages for education for sustainable development in the higher education curriculum. *Curriculum Journal*. Advance online publication.
- Ryan, Y., Fraser, K., Bryant, L., & Radloff, A. (2004). The multiple contexts of higher education staff and academic development. In L. Elvidge, K. Fraser, R. Land, C. Mason, & B. Matthew (Eds.), *Exploring academic development in higher education: Issues of engagement*. Cambridge, UK: Jill Rogers Associates Limited.
- Saldaña, J., Beretvas, N., & Leavy, P. (2011). *Fundamentals of Qualitative Research*: Oxford: Oxford University Press.
- Schön, D. A. (1988). From technical rationality to reflection-in-action. *Professional judgment: A reader in clinical decision making*, 60–77.
- School of Fashion and Textiles. (2008). BA textile design snapshot 2008. Melbourne, Australia: RMIT University.
- Scott, W. (2002). Education and sustainable development: Challenges, responsibilities, and frames of mind. *Trumpeter*, 18(1).
- Scott, W., & Gough, S. (2006). Universities and sustainable development in a liberal democracy: A reflection on the necessity for barriers to change. In J. Holmberg & B. E. Samuelsson (Eds.), *Drivers and barriers for implementing sustainable development in higher education* (pp. 89–96). Paris: UNESCO.
- Segalàs, J., Ferrer-Balás, D., & Mulder, K. F. (2009). *Introducing sustainable development in engineering education: Competences, pedagogy and curriculum*. UPC Sostenible 2015, Barcelona.
- Senge, P. (1990). *The fifth discipline*. New York: Random House.

- Shephard, K. (2008). Higher education for sustainability: Seeking affective learning outcomes. *International Journal of Sustainability in Higher Education*, 9(1), 87–98.
- Sherren, K. (2006). Core issues: Reflections on sustainability in Australian university coursework programs. *International Journal of Sustainability in Higher Education*, 7(4), 400–413.
- Sipos, Y., Battisti, B., & Grimm, K. (2008). Achieving transformative sustainability learning: Engaging head, hands and heart. *International Journal of Sustainability in Higher Education*, 9(1), 68–86.
- Smith Iii, E. A. (2009). *Development of sustainability within a university curriculum*. Atlanta, GA: Georgia Institute of Technology.
- Smyth, J. (1999). Researching the cultural politics of teacher's learning. In J. Loughran (Ed.), *Researching teaching: Methodologies and practices for understanding pedagogy* (pp. 67–82). Abingdon, Oxon, UK: RoutledgeFalmer.
- Smyth, R. (2003). Concepts of change: Enhancing the practice of academic staff development in higher education. *International Journal for Academic Development*, 8(1/2), 51–60.
- Southwell, D., Gannaway, D., Orrell, J., Chalmers, D., & Abraham, C. (2005). *Strategies for effective dissemination of project outcomes*. Brisbane, Australia: Carrick Institute for Learning and Teaching in Higher Education.
- Southwell, D., & Morgan, W. (2009). *Leadership and the impact of academic staff development and leadership development on student learning outcomes in higher education: A review of the literature. A report for the Australian Learning and Teaching Council (ALTC)*. Brisbane, Australia: QUT Department of Teaching and Learning Support Services.
- Stake, R. (2008). Qualitative case studies. In N. Denzin & Y. Lincoln (Eds.), *Strategies of qualitative inquiry* (3rd ed., pp. 119–149). Thousand Oaks, CA: Sage Publications.
- Stefani, L. (2009). Planning teaching and learning: Curriculum design and development. In H. Fry, S. Ketteridge & S. Marshall (Eds.), *A handbook for teaching and learning in higher education: enhancing academic practice* (3rd ed., pp. 40–57). New York: Routledge.
- Stein, S., Isaacs, G., & Andrews, T. (2004). Incorporating authentic learning experience within a university course. *Studies in Higher Education*, 29(2), 239–258.
- Stephens, J., Hernandez, M., Román, M., Graham, A., & Scholz, R. (2008). Higher education as a change agent for sustainability in different cultures and contexts. *International Journal of Sustainability in Higher Education*, 9(3), 317–338.
- Sterling, S. (2004a). An analysis of the development of sustainability education internationally: Evolution, interpretation and transformation. In J. Blewitt & C. Cullingford (Eds.), *The sustainability curriculum: The challenge for higher education* (pp. 43–62). London: Earthscan.
- Sterling, S. (2004b). Higher education, sustainability, and the role of systemic learning. In P. B. Corcoran & A. E. J. Wals (Eds.), *Higher Education and the Challenge of Sustainability: Problematics, Promise and Practice* (pp. 49–70). Dordrecht: Kluwer Academic Publishers.
- Sterling, S. (2010). Transformative learning and sustainability: Sketching the conceptual ground. *Learning and Teaching in Higher Education*, (5), 17–33.
- Sterling, S., & Thomas, I. (2006). Education for sustainability: The role of capabilities in guiding university curricula. *International Journal for Innovation and Sustainable Development*, 1(4), 349–370.
- Sterling, S., & Witham, H. (2008). Pushing the boundaries: The work of the Higher Education Academy's ESD Project. *Environmental Education Research*, 14(4), 399–412.
- Stringer, E., McFadyen Christensen, L., & Baldwin, S. (2010). *Integrating teaching, learning and action research: Enhancing instruction in the K-12*. Thousand Oaks, CA: Sage Publications.
- Summers, D. (2010). Embedding education for sustainable development in initial teacher training in the lifelong learning sector. *Teaching in Lifelong Learning*, 2(1), 35–46.
- Summers, D., & Turner, R. (2011). Outside the green box: Embedding education for sustainable development through cooperative inquiry. *Educational Action Research*, 19(4), 453–468.
- Sustainability Victoria. (2012). Premier's Sustainability Awards 2012. 2011 Winner: Tertiary education, RMIT University. Retrieved January 14, 2013, from <http://sustainabilityawards.vic.gov.au/2011-winner-tertiary-education>
- Taylor, E. W. (2008). Transformative learning theory. *New directions for adult and continuing education*, 2008(119), 5–15.

- Thomas, D. R. (2006). A general inductive approach for analyzing qualitative evaluation data. *American Journal of Evaluation*, 27(2), 237–246.
- Thomas, I. (2010). Critical thinking, transformative learning, sustainable education, and problem-based learning in universities. *Journal of Transformative Education*, 7(3), 245–264.
- Thomas, I., Barth, M., & Day, T. (2013). Sustainability capabilities, graduate capabilities, and Australian universities. *International Journal of Sustainability in Higher Education*, 15(2), 7–7.
- Thomas, I., Hegarty, K., & Holdsworth, S. (2012). The education for sustainability jig-saw puzzle: Implementation in universities. *Creative Education*, 3(6), 840–846.
- Thomas, I., & Nicita, J. (2002). Sustainability education and Australian universities. *Environmental Education Research*, 8(4), 475–492.
- Tight, M. (2004). Research into higher education: An a-theoretical community of practice? *Higher Education Research and Development*, 23(4), 395–411.
- Tilbury, D. (2001). Sustaining innovation in education: Experiences in the learning for a sustainable environment project project. *Australian Journal of Environmental Education*, 17, 87–94.
- Tilbury, D. (2004). Environmental education for sustainability: A force for change. In P. B. Corcoran & A. E. J. Wals (Eds.), *Higher education and the challenge of sustainability. Problematics, Promise and Practice* (pp. 97–112). Dordrecht: Kulwer Academic Publishers.
- Tilbury, D., & Cooke, K. (2005). *Frameworks for sustainability. A national review of environmental education and its contribution to sustainability in Australia – Key findings*. Canberra, Australia: Australian Government Department of the Environment and Heritage and Australian Research Institute in Education for Sustainability (ARIES).
- Tilbury, D., Keogh, A., Leighton, A., & Kent, J. (2005). *A National Review of Environmental Education and its Contribution to Sustainability in Australia: Further and Higher Education - Key Findings*. Canberra, Australia: Australian Government Department of the Environment and Heritage and Australian Research Institute in Education for Sustainability (ARIES).
- Tilbury, D., Podger, D., & Reid, A. (2004). *Action research for change towards sustainability: Change in curricula and graduate skills towards sustainability* (Final report). Canberra and Sydney, Australia: Australian Government Department of the Environment and Heritage and Macquarie University.
- Townsend, A. (2013). *Action research: The challenges of understanding and changing practice*. Maidenhead, Berkshire, UK: Open University Press, McGraw-Hill Education.
- Treleaven, L., & Voola, R. (2008). Integrating the development of graduate attributes through constructive alignment. *Journal of Marketing Education*, 30(2), 160–173.
- Trigwell, K. (2003). A relational approach model for academic development. In H. Eggins & R. Macdonald (Eds.), *The scholarship of academic development* (pp. 23–33). Buckingham: The Society for Research into Higher Education and Open University Press.
- Trigwell, K., & Prosser, M. (1997). Towards an understanding of individual acts of teaching and learning. *Higher Education Research and Development*, 16(2), 241–252.
- Trigwell, K., & Prosser, M. (2004). Development and use of the approaches to teaching inventory. *Educational Psychology Review*, 16(4), 409–424.
- Trigwell, K., Prosser, M., & Waterhouse, F. (1999). Relations between teachers' approaches to teaching and students' approaches to learning. *Higher Education*, 37, 57–70.
- Troyna, B. (1994). Blind faith? Empowerment and educational research. *International Studies in Sociology of Education*, 4(1), 3–24.
- Underwood, J. (2009). Re-design: In pursuit of a sustainable future. In E. Rouse (Ed.), *Fashion and Wellbeing? 11th Annual Conference for IFFTI* (pp. 482–493). London: International Foundation of Fashion Technology Institutes.
- Underwood, J., Wahr, F., Lynas, E., & Beale, C. (2011). A group approach to embedding sustainability within a degree curriculum: Collaborative, creative, iterative. In K. Hegarty, D. Chambers, & A. Beringer (Eds.), *Proceedings of the 10th International Conference of Australasian Campuses Towards Sustainability, 2011* (pp. 63–68). Melbourne, Australia: RMIT, Australasian Campuses Towards Sustainability.
- UNESCO. (2005). *Teaching and learning for a sustainable future. A multimedia teacher education programme*. Paris: UNESCO.

- UNESCO. (nd-a). Characteristics of ESD. Retrieved April 17, 2014, from <http://www.unesco.org/new/en/education/themes/leading-the-international-agenda/education-for-sustainable-development/education-for-sustainable-development/characteristics-of-esd/>
- UNESCO. (nd-b). Three Terms and One Goal. Retrieved February 17, 2014, from <http://www.unesco.org/new/en/education/themes/leading-the-international-agenda/education-for-sustainable-development/three-terms-one-goal/>
- United Nations. (1992). Agenda 21. Boulder, CO: EarthPress.
- United Nations. (nd). Sustainable development goals. Retrieved May 28, 2014, from <http://sustainabledevelopment.un.org/index.php?menu=1300>
- United Nations Department of Economic and Social Affairs. (2009). Division of Sustainable Development. Retrieved from October 21, 2011, from http://www.un.org/esa/dsd/index.shtml?utm_source=OldRedirect&utm_medium=redirect&utm_content=dsd&utm_campaign=OldRedirect
- University Leaders for a Sustainable Future. (2008). About ULSF. Retrieved February 14, 2010, from <http://www.ulsf.org/about.html>
- Vare, P., & Scott, W. (2007). Learning for a change: Exploring the relationship between education and sustainable development. *Journal of Education for Sustainable Development*, 1(2), 191.
- Varga, A., Kószó, M., Mayer, M., & Sleurs, W. (2007). Developing teacher competencies for education for sustainable development through reflection: The Environment and School Initiatives approach. *Journal of Education for Teaching: International research and pedagogy*, 33(2), 241–256.
- Vella, J. (2001). *Taking learning to task. Creative strategies for teaching adults*. San Francisco: John Wiley and Sons.
- Wadsworth, Y. (1998). What is participatory action research? Retrieved May 20, 2007, from <http://www.aral.com.au/ari/p-ywadsworth98.html>
- Wadsworth, Y. (2010). *Building in research and evaluation. Human inquiry for living systems*. Melbourne, Australia: Action Research Press.
- Wahr, F., & de la Harpe, B. (in press). Changing from within: An action research perspective for bringing about sustainability curriculum change in higher education. In M. Barth, G. Michelsen, M. Rieckmann, & I. Thomas (Eds.), *Handbook of higher education for sustainable development*. London: Routledge.
- Wahr, F., & Underwood, J. (2010). Dealing with complexity in education for sustainability – a shared journey for students and teachers in design education. In G. Forsyth (Ed.), *Proceedings of CONNECTED 2010 International Conference on Design Education, Sydney, Australia, 28 June–1 July 2010* (pp. 1–6). Sydney, Australia: The University of New South Wales.
- Wahr, F., Underwood, J., Adams, L., & Prideaux, V. (2013). Three academics' narratives in transforming curriculum for education for sustainable development. *Australian Journal of Environmental Education*, 29(1), 97–116.
- Wals, A. E. J. (2009). *Review of context and structures for education for sustainable development 2009*. Paris: UNESCO.
- Wals, A. E. J. (2010a). Between knowing what is right and knowing that is it wrong to tell others what is right: On relativism, uncertainty and democracy in environmental and sustainability education. *Environmental Education Research*, 16(1), 143–151.
- Wals, A. E. J. (2010b). Mirroring, gestaltswitching and transformative social learning: Stepping stones for developing sustainability competence. *International Journal of Sustainability in Higher Education*, 11(4), 380–390.
- Wals, A. E. J. (2011). Learning our way to sustainability. *Journal of Education for Sustainable Development*, 5(2), 177–186.
- Wals, A. E. J. (2014). Sustainability in higher education in the context of the UN DESD: A review of learning and institutionalization processes. *Journal of Cleaner Production*, 62, 8–15.
- Wals, A. E. J., & Blewitt, J. (2012). Third wave sustainability in higher education: Some (inter) national trends and developments. In S. Sterling (Ed.), *Sustainability education: Perspectives and practice across higher education* (pp. 55–74). Hoboken: Earthscan.
- Wals, A. E. J., & Jickling, B. (2002). “Sustainability” in higher education: From doublethink to newspeak to critical thinking and meaningful learning. *International Journal of Sustainability in Higher Education*, 3(3), 221–232.

- Walsh, A. (2007). An exploration of Biggs' constructive alignment in the context of work-based learning. *Assessment & Evaluation in Higher Education*, 32(1), 79–87.
- Warhurst, R. (2006). "We really felt part of something": Participatory learning among peers within a university teaching-development community of practice. *International Journal for Academic Development*, 11(2), 111–122.
- Watson, M. K., Lozano, R., Noyes, C., & Rodgers, M. (2013). Assessing curricula contribution to sustainability more holistically: Experiences from the integration of curricula assessment and students' perceptions at the Georgia Institute of Technology. *Journal of Cleaner Production*.
- Webb, G. (1996). *Understanding staff development*. Buckingham, UK: Society for Research into Higher Education and Open University Press.
- Webster-Wright, A. (2009). Reframing professional development through understanding authentic professional learning. *Review of Educational Research*, 79(2), 702.
- Weimer, M. (2012). Learner-centred teaching and transformative learning. In E. W. Taylor & P. Cranton (Eds.), *The handbook of transformative learning: Theory, research, and practice* (pp. 439-454). San Francisco: John Wiley & Sons.
- Wiek, A., Withycombe, L., & Redman, C. L. (2011). Key competencies in sustainability: A reference framework for academic program development. *Sustainability Science*, 6(2), 203–218.
- Willcoxson, L., Wynder, M., & Laing, G. K. (2010). A whole-of-program approach to the development of generic and professional skills in a university accounting program. *Accounting Education*, 19(1–2), 65–91.
- Winter, J., & Cotton, D. (2012). Making the hidden curriculum visible: Sustainability literacy in higher education. *Environmental Education Research*, 18(6), 783–796.
- Wisker, G., Watkins, M., Forgan, A., & Hughes, S. (2002). *Fellowship: Building the people culture and embedding good practice – Putting learning and teaching strategies into action*. Paper presented at the 4th World Conference of the International Consortium for Educational Development, Perth, Australia.
- Wolf, P. (2007). A model for facilitating curriculum development in higher education: A faculty driven, data informed, and educational developer-supported approach. *New Directions for Teaching and Learning*, 2007(112), 15–20.
- Wooltorton, S., Palmer, M., & Steele, F. (2011). A process for transition to sustainability: Implementation. *Australian Journal of Environmental Education*, 27(01), 160–174.
- Wright, C. (2009a). Inside out? Organizational membership, ambiguity and the ambivalent identity of the internal consultant. *British Journal of Management*, 20(3), 309–322.
- Wright, T. (2004). The evolution of sustainability declarations in higher education. In P. B. Corcoran & A. E. J. Wals (Eds.), *Higher education and the challenge for sustainability: Problematics, Promise and Practice* (pp. 7–20). Dordrecht: Kluwer Academic Publishers.
- Wright, T. (2009b). University presidents' conceptualizations of sustainability in higher education. *International Journal of Sustainability in Higher Education*, 11(1), 61–73.
- Yin, R. K. (1994). *Case study research: Design and methods* (2nd ed.). Thousand Oaks, California: Sage.
- Yorke, M. (2002). Labouring 'more abundantly than they all'? In C. Baume, P. Martin & M. Yorke (Eds.), *Managing Educational Development Projects: Effective Management for Maximum Impact* (pp. 185–203). London: Kogan Page Limited.
- Ziegenfuss, D. H., & Lawler, P. A. (2008). Collaborative course design: Changing the process, acknowledging the context, and implications for academic development. *International Journal for Academic Development*, 13(3), 151–160.
- Zuber-Skerritt, O., & Fletcher, M. (2007). The quality of an action research thesis in the social sciences. *Quality Assurance in Education*, 15(4), 413–436.
- Zuber-Skerritt, O. (2002). A model for designing action learning and action research programs. *The Learning Organization*, 9(4), 143–149.
- Zuber-Skerritt, O., & Perry, C. (2002). Action research within organisations and university thesis writing. *The Learning Organization*, 9(4), 171–179.
- Zuckerman, M. (1960). The development of an affect adjective check list for the measurement of anxiety. *Journal of Consulting Psychology*, 24(5), 457–462.
- Zuckerman, M., Lubin, B., & Rinck, C. M. (1983). Construction of new scales for the multiple affect adjective check list. *Journal of Psychopathology and Behavioral Assessment*, 5(2), 119–129.

Appendix A – Initial interviews of academics - interview schedule

Initial interview schedule with program academics

The interview will be semi-structured. The following questions provide a guide to the areas the interview will aim to cover.

It is intended that, with your permission, this interview will be recorded.

If you have any concerns about any aspect of these questions or the interview please do not hesitate to raise them with me.

About you

1. Please tell me a little about your professional/teaching background.
2. What does sustainability and/or sustainable development mean to you?
3. In what ways do you support sustainability or sustainable development?

About teaching and learning

4. Please describe your teaching approach?
5. What input have you had to program and course design?
6. Have you been involved in other teaching and learning/curriculum related projects? What was that experience like?
7. Please describe how staff work together in this School?

About the program

8. How is sustainability or sustainable development viewed within the industry?
9. How is sustainability or sustainable development viewed within this School/ university?
10. How important is it that sustainability or sustainable development is included in this program? What aspects of sustainability or sustainable development in particular? Why?
11. What are the current student learning outcomes related to sustainability or sustainable development in the program? Does this go far enough?
12. Thinking about the approaches you use to teach students, in what ways do these support sustainability or sustainable development?
13. What barriers are there to providing a program/courses which support sustainability or sustainable development learning outcomes for graduates?

About the project

14. In this project staff will be working towards embedding sustainability into the curriculum, what support will staff need?
15. What outcomes would you like to see achieved from the 'embedding sustainability' project? How/when would you know they had been achieved?
16. What suggestions do you have for how the project might be undertaken?

Appendix B – Initial interviews of academics – codes identified from transcripts

A : values based education - culture
B : use of TIT in other courses
C : team enthusiasm for improvement
D : TD discipline and sustainability
E : sustainability curriculum possibilities
F : students' interest in sustainability
G : student critical thinking
H : signs of trust
I : significance of AB's expertise to the program
J : School-University context
K : reflective practice in L&T
L : past involvement in L&T
M : need of professional development
N : maintaining TD professional current
O : local action
P : L&T approaches used
Q : interest in project/ what academics want to get out of the project.
R : integrating L&T enhancement into the project
S : integrating design and sustainability
T : industry as sustainability practitioners
U : importance of educating students as way to achieve change
V : identity as researchers
W : how academics see the project 2008
X : having to deal with complexity
Y : group-program context
Z : Goals and benefits of the project
AA : FW explaining project 2008
AB : flexible project design
AC : existing levels of sustainability expertise
AD : example of integrating sustainability into course
AE : example of enviro aspect in teaching
AF : example of co-development of the project
AG : engagement with industry
AH : drivers for being involved
AI : design - creativity
AJ : curriculum design 2008
AK : current sustainability teaching
AL : courses taught by academic
AM : confidence in curriculum change
AN : change engagement

AO : barriers to being involved

AP : academics understanding of sustainability 2008

AQ : academics' perception of their own readiness to teach sustainability

AR : academics needing to be critical to do sustainability

AS : academics' interest in being involved in research linked with the project

AT : academics have responsibility to improve sustainability practice

AU : academics' autonomy

Appendix C – Survey of Academics 1 – survey instrument and results

Question A: Indicate how much each form of activity contributed to your ability to embed sustainability into your curriculum		survey 1	survey 2	survey 3	survey 4	survey 5	survey 6	survey 7
A1	Being interviewed by Fiona	3	3	4	3	3	3	2
A2	Reviewing the initial SWOT analysis for the project (workshop 1)	3	4	4	3	2	3	2
A3	Co-constructing the project design and implementation	4	4	4	4	3	4	2
A4	Developing the draft definition developed for the TD program as a group (workshop 1)	3	4	4	4	4	2	2
A5	Developing a list of the knowledge, skills and values (Head, heart, hands) associated with learning about sustainability in TD. (workshop 1)	2	4	4	4	3	3	3
A6	Attending AB's presentation to the group on sustainability and related issues	4	4	na	4	4	3	na
A7	Mapping sustainability learning within your courses	4	3	4	4	2	4	3
A8	Discussing sustainability with Fiona throughout the project	4	4	4	4	4	4	3
A9	Completing the 'approach to teaching' questionnaire followed by discussion with Fiona	4	3	na	4	2	4	2
A10	Visiting Sustainability Victoria	na	na	3	4	na	3	3
A11	Keeping your reflective journaling	2	-	na	1	na	na	na
A12	Discussing learning and teaching generally with Fiona	3	4	3	4	4	4	3
A13	Identifying new sustainability related intended learning outcomes for your courses	4	3	4	4	3	4	3
A14	Reviewing the course sustainability maps for the program as a whole	4	4	4	4	4	4	3
A15	Finding and sharing sustainability related materials – cuttings, websites, papers etc	3	3	na	3	2	3	4
A16	Receiving the research papers circulated relating to textile design, teaching and learning for TD and sustainability in the textile industry	2	3	4	3	3	4	4
A17	Trialling the inclusion of sustainability elements in your courses in semester 2, 2009	4	4	na	4	2	4	4
A18	Discussing your sustainability teaching trials with Fiona	4	3	na	4	3	4	3
A19	Discussing sustainability teaching in textile design informally with your colleagues	3	3	4	4	4	4	3
A20	Writing scholarly academic papers relating to your sustainability teaching	4	na	na	3	na	4	4
A21	Team teaching relating to sustainability with Fiona, e.g. CAD or TIT	3	3	na	na	na	4	4
A22	Workshop 4 overall – Dec 2009 – assessing sustainability	3	3	na	4	na	4	2
A23	Working independently on sustainability research /learning relating to the project– please describe	4	na	-	4	4	3	3

A24	Workshop 1 overall (introduction to project, group definition of sustainability & HHH, Dec 2008)	3	4	4	3	3	3	3
A25	Workshop 2 overall (introduction to mapping sustainability within the course, Jan 2009)	3	4	4	3	na	4	3
A26	Workshop 3 overall (review of course maps for program as a whole, July 2009)	3	3	4	4	na	4	3
A27	Workshop on assessment (Dec 2009)	na	3	na	3	3	4	3
A28	Other activity – please describe	-	-	na	-	-	-	-
A29	Overall, how satisfied have you been with the approach used in the project	4	4	4	4	4	4	4
Question B: Indicate to what extent you agree with each statement								
B1	The project helped me deepen my understanding of sustainability education in textile design	4	3	4	1	3	4	1
B2	During the project I actively interacted with others working on the project	3	4	3	4	2	3	4
B3	The work done in the project is important	4	4	4	4	3	4	4
B4	I felt committed to being involved in the project	4	4	3	4	3	4	3
B5	We would have achieved the same outcomes without a dedicated project to embed sustainability in the program.	4	1	2	1	2	4	2
B6	During the project my beliefs about teaching sustainability in the textile design program have been challenged	2	2	2	3	3	3	2
B7	It felt good to be involved in the project	3	3	3	4	3	4	3
B8	The project provided me with a supportive environment to learn more about sustainability education in textile design	3	3	4	4	3	4	3
B9	The project has been relevant to my teaching	4	3	3	4	3	4	4
B10	I understood the objectives of the project	4	4	3	3	3	4	3
B11	I have been in control of my involvement in the project	4	4	3	4	3	4	3
B12	The project prepared me to teach sustainability in the courses I teach	3	4	3	3	2	3	2
B13	The words below could describe how you felt about participating in the project to embed sustainability in the textile design program. Read through the list of words and underline those which describe how you generally felt about participating in the project. You may underline as many or as few words as you wish.	9	7	9	9	9	9	10

	C1 What does sustainability mean to you?	C2 Has your understanding of sustainability changed over the duration of the project? If yes, how has your understanding changed?	C3 How is sustainability best taught?	C4 Has your view shifted? If yes, how has your view changed?
Survey 1	It means keeping eyes open for achieving best possible outcomes for people in the context of that environment	Yes, I have more general knowledge in relation to textile related issues of waste and consumption and of its interconnectivity to life overall	Absolutely as an embedded "assumption" or "framework". But also with the inclusion of specific information - ie [AB's class] and CAD where relevant to design outcomes	Not a lot in terms of sustainability itself, however in terms of teaching, I think I have improved, both in terms of teaching methodology and content.
Survey 2	Beyond "Eco/green" - a holistic approach ideology and practice that is engaged and aware of sustaining and nurturing the various environments in which we live, work, play, produce.	Rather than changed, perhaps become more informed and broadened.	Without ramming down their throats the "S" word! Sustainability is best taught as a part of the design process - integral to "good" design	see C2 - broadened and deepened
Survey 3	How we manage finite resources - not just at the program level. Seeing the 'S' word implemented across all facets of the working day at Brunswick	Definitely yes. A much better understanding of our responsibility and role to guide, inform and nurture best practice within our L&T and program. A bigger picture role - holistic, not specific	Theory, examples in action, in practice through workshops and 'real' projects. - Learning by examples - practice what we preach	No, not really. Textile designers and cohort in general - aware already of trends and practices
Survey 4	making educated choices, - consideration of people and the environment, - doing the right thing, - learning as you go	Not so much, I think it has evolved. I didn't know as much about the social aspect when the project began, have a better understanding now. I felt I lead a reasonably sustainable life outside of RMIT. Feel more comfortable to challenge students in their thinking and approach to design.	Hmmm... A blended approach. Some theory (essays, group presentations, etc). I think giving students a little and encouraging them to investigate further is empowering. Maybe it is better learned than explicitly taught. Guest speakers, exhibitions, case studies are useful. Taking it outside of class environment, making it more 'real'. Reinforcing the notion of 'good design'. This is sustainable.	Not really. Feel better equipped to bring my personal approach to coursework. Masters literature review and conference paper helped to align my personal 'manifesto' (for want of a better word) with my design approach and subsequent teaching of it.
Survey 5	A shift in the way we live day to day. Lifestyle change - major consumer shift	No, but knowledge of subject matter has expanded.	Embedded, not forced. Research as parts of broader projects.	No.
Survey 6	The three pillar approach - taking responsibility, being accountable for the environmental, economic and social impacts our actions have. Thinking long-term about future generations and needs. An attitude - sustainability is part of a	Yes. Previously I was perhaps more aware of the environmental issues, looking at it from a more practical and immediate level. Generally I feel more aware of the issues within the textile industry as well as	Mmm. This is a hard one. Ideally varied approaches. There has to be some theory and general basics outlined initially so students understand the issues. However this lecture style of delivery of information isn't really enough - for relevance to design process a practical application of sustainability within the brief and project	View on teaching sustainability is perhaps the same as teaching other textile design skills - a good balance of theory and practice.

	full and rounded life.	what approaches are being developed.	outcomes is also needed. Linkages with industry would also help to round out the teaching. I feel I'm still learning myself what works best - hopefully building up networks. There is also a place for general skills such as problem solving, confidence in tackling unfamiliar problems and research.	
Survey 7	The consideration of environmental, ethical and economic factors to ensure needs of the present can be met without compromising the future	It is evolving - the more I learn/read the more complex and perhaps sophisticated my understanding is becoming	Teaching needs to reflect sustainability's multi-dimensionality through a student centred approach	I think again like C2 it is evolving and is becoming more aware.

Indicate the extent to which these have been addressed	survey 1	survey 2	survey 3	survey 4	survey 5	survey 6	survey 7
D1 Provision of staff development	3	4	2	3	1	3	2
D2 Development of resources	3	3	2	3	2	2	3
D3 Changes to the curriculum	4	4	4	4	3	3	3
D4. Engagement of students	3	3	4	3.5	3	4	2
D5 Engagement of other stakeholders	-	2	-	2	2	3	2
D6 Driving local action	3	2	4	1	1	3	1
D7	No question						

D8. The three most useful things I have learned from being involved in the project are:	
Survey 1	1. Considering sustainability as underpinning all design areas and most particularly that "good" design is about sustainability. 2. Introducing sustainability to teaching should be part of the framework and not an add on and that it should be relevant to the subject taught. 3. The big wide world out there is still way behind when it comes to thinking and bringing about environmental change. Textile big business is behind particularly.
Survey 2	1. Implementing / scaffolding learning activities and reviewing progress when introducing sustainability. 2. Developing a program wide view and awareness. 3. Deeper understanding of sustainability - related issues, theories and practice.
Survey 3	1. I am not alone! I cannot undertake this project activity without support and encouragement and expertise. 2. Team activity important to get a 'big picture' view across to staff and students. Taking people along with you - shared interests. 3 Involvement at all stages of a project. The theme of 'sustainability' is not a concept but a 'doable ' L&T outcomes. Theory and practice combined.

Survey 4	1 - valuing one another's skills and trust are what makes this type of work possible. Would not have been possible if individuals were not open and honest and willing to share their work. 2. L&T tricks of the trade, particularly ILO's and SOLO taxonomies. Very helpful. 3. Insights in research, having Fiona and [another academic developer] in the office as research mentors 'without even know it' was very helpful.
Survey 5	1 Learning and teaching approaches to project/course planning eg. ILO's 2. Subtle delivery has been more successful in courses over including assessable components - students response more positive. 3. Discovering new and better resources to feed into class content (all with sustainable focus).
Survey 6	1. teaching and learning rhetoric. Concrete ways of defining how my curriculum can adapt to include sustainability. Fiona's assistance to implement these changes. 2.The importance of being across the facts and issues. Keep reading, keep your mind open. 3. Try not to be too overwhelmed. My understanding of sustainability has really developed over the last 18 months, which can be overwhelming. It has helped to try and feed this awareness into my specialist area of print and try to make some changes at ground level.
Survey 7	1. various aspects of L&T theory, particularly with SCL. 2. To reflect on the process of teaching - what we do, how and why. 3. Made me more aware of my own teaching practice.

	D9 Suggestions for how the project might be improved	D10 Any other comments?
Survey 1	Not particularly - your positive energy and food provisions were a great add on! Thanks.	
Survey 2	More time/ planning of the plan / design / implementation process before and during teaching periods - difficult to sometimes manage the aspirations for EFS and practicality of implementing etc	This has been a fantastic vehicle to enable the program team to become a well integrated, cohesive, collegiate group. We have had the opportunities to innovate and engage creatively in our curriculum design. Thanks.
Survey 3		A bigger University investment in sustainable infrastructure - buildings, resources, planning. Etc. David and Goliath scenario - what can we do to change the mindset of a corporate organisation?
Survey 4	Keep it evolving, there is no finish.	Thanks Fiona, has brought the team together. I think we are working more collaboratively than before we started the project. This is what makes us what we are.
Survey 5	no - organic process which responds to participants!	
Survey 6	I wish I had been more diligent in keeping a 'journal'. Perhaps a small session on the benefits of reflective writing for teaching practice.	Thanks Fiona.
Survey 7	Difficult to say - with workloads, the challenge is always about time. So, the need to be flexible which the project (Fiona) has been.	The project and being involved in the project has been a very worthwhile process. Fiona's enthusiasm and commitment has been the most positive part of the project - inspiring.

Appendix D - Survey of Academics 2 – survey instrument and results

Question 1: Thinking about the project overall, what are the three most useful things you have learnt from your involvement in the project:			
Respondent 1	To value the knowledge of your team members	To share your knowledge with your team members	Developing ILO's, constructive alignment
Respondent 2	planning teaching content and assessment using ILO's	how to embed sustainability into course content	introducing new teaching approaches and more student centred learning activities to reflect sustainable practice and processes
Respondent 3	Expansion of personal knowledge base around sustainability	Consideration of methods with regards to teaching delivery to enable sustainability learning	Learning and Teaching theory and practise
Respondent 4	Expanded research & practical knowledge related to sustainability that now covers the 3 strands - social, economic & environmental	Developed my L&T theory and language, and experienced how useful this was to enrich, support and make sense of the way sustainability could be integrated into my courses/projects.	Successful collaboration result - between facilitator and the program but also between staff
Respondent 5	Understanding the complexity of Efs	engaging in curriculum change	Deeper understanding of the holistic view & approach to TD practice
Respondent 6	Team participation	Holistic view of sustainability within the program	Personal introspection and the need for ongoing self-evaluation
Respondent 7	the L & T framework	it has reminded and reinforced to me the importance of teamwork	how great the BATD team is

Question 2: If we were starting the project again, what three things would you suggest we do differently?			
Respondent 1	I don't think I can suggest anything here, I think it is messy to begin with, and you have to get through the process of troubleshooting	Maybe start straight up with the team ILO / constructive alignment workshop, this was useful for all staff, it got people thinking about assessment and eventuated in a common assessment language	[no response]

Respondent 2	Sorry, I can't think of any	[no response]	[no response]
Respondent 3	Getting a clearer idea of the fact that there were two prongs to the research - Embedding sustainability and L&T. I didn't twig to the L & T focus for a while	[no response]	[no response]
Respondent 4	I'm having difficulty thinking of anything - from my perspective the project developed quite organically and the facilitator was very aware of how much time we had to put into it and the key/best times to get the most out of the group to fit in with the teaching period	Personally, I wish I had been more disciplined to keep a consistent L&T journal to document my thinking processes through the project	[no response]
Respondent 5	develop the program map earlier	Develop our understanding of the TD teaching pedagogy - although this evolved	[no response]
Respondent 6	Shorten the time frames - project fatigue	In retrospect - more team based activity at the inception stage	Possibly more physical documentation of process
Respondent 7	none	[no response]	[no response]

Question 3: Reflecting on the changes to the curriculum and teaching as a result of being involved in the project, what were the three most successful outcomes for your courses and your teaching the first time you taught the new curriculum (2010)?

Respondent 1	I did a lot of research into HE design assessment, along with a colleague we developed a rubric model that assessed the process, product and person (which reflected the current research undertaken by L&T HE academics). The rubric although very time consuming to put together is helping staff to really think about what it is they are assessing students on. In conjunction with the ILO document, brief, assessment criteria and standards, it makes it easier for me to articulate what it is students are aiming for. This is useful particularly in first year, when students are unsure of HE learning expectations, it helps them to learn how to be reflective and critical of their
--------------	---

	<p>work, and the work of others. The word sustainability is listed as such in the product criteria, however we have noticed that it is applicable in process and student also, but not usually given the name of 'sustainability'. I think what we are noticing is that best practice in textile design is underpinned by the principles of sustainability and doesn't need to be constantly labelled in this way. The rubric isn't perfect by any stretch of the imagination, it has its flaws but as a team we're constantly refining and making it better.</p>
Respondent 2	<p>The changes implemented into courses have been more emphasis placed on efficient design process. This has been introduced as part of the assessment criteria and has put more responsibility on the student and how they engage with their design process. I've been able to build into projects this as a requirement which reflects their work practice and professionalism as an important component, where previously it was expected but not assessed.</p>
Respondent 3	<p>My project planning is more complex by considering concrete skills vs. knowledge skills development. Theoretical L & T considerations, such as scaffolding has been enabled by opening up discussions between staff so that we actively manage what is delivered at different year levels. Development of ILO's, Assessment Criteria and Assessment Rubrics for the Courses I teach.</p>
Respondent 4	<p>Overall I have been open to change, especially in year 2 courses, as I have not taught the same project since 2010. Different projects and opportunities to work with external parties or Industry appear so the content has changed with each year. From [name of] industry projects and collaborations]. Currently investigating a project to collaborate with an architect who is undertaking a renovation of a local Brunswick church. Within year 2, the print workshop in general, there are aspects of environmental, social and cost that has been difficult to oversee. I have endeavoured to maintain an ongoing focus on sustainable print systems and this seems to evolve as new print products appear on the market with the growing awareness of sustainability. We have an expanding library of materials and contacts for fabrics, which are produced under more sustainable methods. One challenge though is that this has been difficult to control across year 1 and year 3 as I do not teach within those courses. Looking ahead to program changes this might be more possible. Teaching into year 1 of the program I have been fortunate enough to contrast the experience by just developing the one student project with a sustainability context throughout the duration of the ESD projects length. This has definitely morphed from 2009-2011 and hopefully improved. While [student project name] has had an explicit sustainability LO, it has been interesting to look over the other projects within the course to establish how the more design focused LO's also add up to enhance the students skills as thinkers, researchers and problem solvers.</p>
Respondent 5	<p>Changes to my L&T practice have included better scaffolding of learning activities and a better sense of connectedness across courses.</p>
Respondent 6	<p>Significantly more awareness and willingness to embrace sustainability principles within the broader framework of the program. Success has been measured by</p>

	<p>recognition from collegiate and government agencies that confirms it is curriculum change and not bricks and mortar than defines a successful L&T strategy in HE programs. I have not made significant changes to my (minimal) teaching input in to the program. My role as a promulgator of the textile design program to external colleges and schools ensures the sustainability aspects of the program is promoted and it has had a significant impact on prospective students applying to the program because of 'what we do and how we do it'. We have tested and put into the program various L&T models of best practice. The graduates of the program have benefited greatly from the last two years of embedded sustainability and the inherent intellectual and moral obligations of best practice within the textile discipline. We have led the School and probably the University in showcasing and delivering a suite of curriculum innovation, from project delivery to program renewal.</p>
Respondent 7	<p>It is only now (2012) that I can see the impact this project has had on particularly 3rd year - [course name] These changes really started to happen in 2011 and really in 2012. Note in 2010 I was [describes extra responsibilities] so not a lot of time was given to changing the third year course. My concept of sustainability has broadened – more sophisticated and multi-dimensional. The project has made me reflect more deeply on my own teaching practice and how I communicate 'learning' to students. Particularly for final year students around reinforcing the link between graduate capabilities and learning outcomes / assessment – why we do what we do.</p>

Question 4: Reflecting on the changes to the program overall, what benefits have resulted from the project?	
Respondent 1	<p>More discussion amongst peers, an openness and willingness to share ideas and experiences (both good and bad). Overall something like this can only be a success if the academic staff are committed and trusting of one another.</p>
Respondent 2	<p>I think our students generally show greater consideration for the way they work within studio environments. They also have a broader understanding not only of sustainability issues, but of ethical design and production. Over the last few years, there have been particular students who have become active in these areas, through project work and community engagement. I think having knowledge in these areas gives students confidence to explore issues more broadly and in some cases make changes to how they live and work from day to day. It's also been beneficial on a practical level, with students, recycling and re-using materials where possible. I think, although not directly the aim of the project, the introduction of holistic assessment approaches (rubric) and alternate methods to planning course content has also been beneficial. The project was also beneficial for us as a team. I think it forced us to think about our program as a whole and what skills we wanted our graduates to leave our program with.</p>
Respondent 3	<p>Our program has been acknowledged externally and some internal management have also had to take notice. Opening up discourse between staff around projects. We have needed to embark on increasing our research profile as part of the demands of</p>

	<p>the university and your [facilitator's] research has been (serendipitously) well timed to coincide with this. We are honing our research skills through the learning around embedding sustainability & exploring it in the context of L & T. A stronger emphasis around our learning culture as staff has arisen. Even though we were active learners before, perhaps we are more conscious of it now, and of the value this delivers to our program.</p>
Respondent 4	<p>Apart from discussing the benefits of the deeper L&T commitment to sustainability. In reference to being open to changes and taking on different projects as they arise, the benefits have been: - Staff learning with the students as these new project challenges arise. - A wider acknowledgement and interaction with other groups and organisations working with similar goals - eg. [industry and community organisation names].- Each year level seems to be developing its own personality in accordance to the aspects of sustainability/projects they might have covered within each year level. - Generally there is a greater feeling of community within the program. -From a student perspective things like student fundraising, cake stalls, pedal pushers and program field trips have helped the program to unite in a sense. -Larger activities like Commune, campus sustainability committee, recycling program, Awards and research paper writing have furthered the impact of the curriculum change as it is being supported and validated outside of the program and the University. -The on flow of L&T theory, constructive alignment of sustainability LO's and assessment led to an overview in 2011 of our assessment practice in year 1 and 2 Design, Studio and CATD courses and has grown across the program in 2012.</p>
Respondent 5	<p>Better constructive alignment across program courses - deeper understanding of the holistic view & approach to TD practice</p>
Respondent 6	<p>Increased awareness and recognition of the program from within the University and externally from our intra and interstate University colleagues. Increased awareness and recognition from our industry colleagues, specifically this year when we have been re-negotiating our IPA's (Industry Partnership Awards). These are sponsored awards for students and the program. The emphasis on sustainable production, best practice, local inputs and ethical standards is implicit in building a relationship with an IPA industry partner. If the organisation does not meet this framework criteria, then we will not accredit them with our IPA status. The IPA has now developed into a 'must have' relationship for our selected partners. Before we move into our renewed 2013 program structure, we probably should have a retrospective review (late 2012) of what worked best and take the key outcomes into our next iteration of the program.</p>
Respondent 7	<p>Although we have always been close collaborative team, this has been a great opportunity to demonstrate our teamwork. This project has further helped to strengthen the program team. By focusing on sustainability as a group, we have shared our learning, approaches and individuals have carved out new areas of expertise - this is a great thing. For sustainability to be meaningful and a change agent it must be shared and as diverse as possible. I get the privilege of teaching final year students. I can see the changes in the curriculum have led to the new approaches and thinking around design, and reinforced the value of creativity. This has enabled me to</p>

	be focused on context driven design outcomes. I.e. students now might work with issues of urbanisation, such as high density living, well-being and so on. This is only possible because of the great work (and hard work) that has occurred in 1st and 2nd year courses.
--	---

Question 5: If you would like to add any further comments or reflections about the project, please use the following box.

Respondent 1	Thanks Fiona, it's been a great professional development exercise for the team. I think we're in a much better position than we were pre 2010.
Respondent 2	[no response]
Respondent 3	Fiona, your presence in our program has been energizing and positive and your warm and engaging manner has meant that this has been a great journey. Your facilitation has been a major force in assisting us to achieve some great outcomes for the program - you are a great change agent!
Respondent 4	Not going to deny that the project was challenging at times. Fitting in the meetings, keeping to deadlines, rewriting course outlines, content and projects. But it was rewarding to have committed as a staff group and to keep each other on track. There was a huge advantage and assistance in having a facilitator (maybe the better description is mentor) who challenged us to reflect on our L&T practice in quite specific ways to get the project rolling along and also to maintain its momentum. This facilitation was across a theory base but also within our teaching practice, sitting in on classes, participating in certain learning activities and analysis of assessment in 2010 really impacted on my teaching preparation and habits. Especially by reflecting on how I guide students to participate in theory or concept driven skills and content.
Respondent 5	[no response]
Respondent 6	Thank you!
Respondent 7	Thank you Fiona for all your input. I think much of the projects success to embed sustainability is because of your hands-on approach and enthusiasm for the project. Thank you!

Appendix E – Student survey – summary of results for Question 6

Student Survey Question 6 - Students were asked to “Write four (4) words or terms you associate with sustainability”

Analysis

Students’ responses were considered and explored for themes by two independent coders. Coding across the two coders was found to be comparable by checking the Kappa co-efficient.

Two types of analysis were done on the students responses. First, each response was coded; therefore there were four pieces of coded data per student per survey. Results and findings for this can be found in the section Coding 1. Second, the same four responses were considered together resulting in one overall code per student per survey – refer to Coding 2.

Coding 1

The following codes (table 1) were identified from students’ individual responses (note: there are no codes for 3, 4 & 10).

Code Number	Code Name	Code Description
1	Attributes	Where students wrote single words and/or decontextualised terms which refer to intrinsic qualities and characteristics or adverbs and adjectives. Hence these are ways of describing. Some terms might also be interpreted as nouns, for example, “harmony”, but as this refers to a way of being it has been interpreted as an attribute students associate with sustainability.
2	Cognitive Strategies	Where students wrote single words and/or decontextualised terms which suggest some sort of cognitive process or strategy (verbs or nouns associated with thoughts and thinking - for example “consideration” and “considering”). This node does not include terms which refer to a cognitive strategy in a specific context or application, for example, “carbon considerations” or “conscious consumption”. In these cases, the context or application have been privileged in coding.
5	Economic Oriented	Where students wrote the word “economic” or words and terms that refer to economics related practices or considerations, for example, “development”.
6	Environmental Oriented	Where students wrote single words or terms which specifically refer to the environment, for example “environment” or “green” or words and terms that refer to environmental practices or considerations, for example, “environmentally friendly” or “environmental impact”, or terms that refer to parts of the environment, for example, “climate”.
7	Management	Where student wrote single words or terms which relate to management strategies, for

	Strategies	example, “planning” and “quality”.
8	Negative Environmental Impacts	Where students wrote single words or terms which describe the environmental impacts of unsustainable practices, for example, “pollution” and “climate change”.
9	Other	Where students wrote single words or terms which do not align with established nodes.
11	Social Oriented	Where students wrote to words or terms which describe aspects of society, for example “community” or social interactions, for example, “fair trade”.
12	Time Oriented	Where students wrote words or terms suggested the significance of time. These might describe a point in time, for example, “future” or the pacing of time, for example “slow” or the use of time as a resource, for example, “time management”.
13	Design Strategies	Where students referred to the role of design or a specific design strategy. This code will include terms which students have been specifically taught within the program (for example, upcycling, zero waste, slow design, no-waste) or relate to the textile design industry – (for example, make and manufacture). Fibres/textiles is also included here as these are the resources or products of their designs
14	Sustainable Practices	Where students referred to commonly known sustainability practices to support sustainability (for example, recycle, reduce, renew) or sustainable use of resources (for example renewable energy).
15	Conceptually Holistic	Where students referred to ‘big picture’ concepts and interconnected notions of sustainability or simply the term ‘holistic’. This would also include the ‘cycle’ and ‘relationship’ sub-codes.

Table 1 – Codes identified from students’ responses to “Write four (4) words or terms you associate with sustainability”

Coding 1 Results

As there was a lot of data resulting from this coding approach, the statistical analysis was undertaken to show the extent of change in code usage over time considering all students’ responses, as shown in the table 2.

Reading the table - For example consider code 6 – environmentally oriented responses. In the first survey it was used in 31.4% of overall responses, 33.9% the next and 31.8% in the last student survey. Therefore the change between survey one and survey two as an increase of 2.5, between survey two and survey three – a decrease of 2.1 and therefore overall, between survey 1 and survey 3 an increase of .4, which is fairly constant. Compare that with code 13.

Q 6 Code	t1: Valid Percent	t2: Valid Percent	t3: Valid Percent	Change between t1 and t 2	Change between t2 and t3	Change between t1 and t3
1	12.7	10.3	9.1	2.4	1.2	3.6
2	2.6	3.4	4.5	-.8	-1.1	-1.9
5	1.7	.9	.8	.9	0.0	.9
6	31.4	33.9	31.8	-2.5	2.1	-.4
7	.4	1.7	2.1	-1.3	-0.3	-1.6
8	3.1	3.9	2.5	-.8	1.4	.6
9	.4	.4	.4	.0	0.0	.0
11	3.9	1.7	2.5	2.2	-0.8	1.5
12	8.3	10.3	6.2	-2.0	4.1	2.1
13	11.4	10.3	18.2	1.1	-7.9	-6.8
14	24.0	21.0	19.0	3.0	2.0	5.0
15		1.7	2.1	-1.7	-0.3	-2.1
Total	100.0	100.0	100.0			

Table 2.

Coding 1 Findings

Over the year students increased their usage of terms to do with **design related strategies** to the largest extent, followed by **holistic conceptualisations**, **cognitive strategies**, **management strategies**, and to a small extent **environmental terms**.

The number of codes that were included in the 'other' remained the same.

The codes that decreased in usage were **negative environmental impact** to a small extent followed by **economic** responses declining in usage more, then **socially oriented** terms, **time oriented**, and **attributes** with **sustainability strategies** reducing in use the most.

Coding 2

The following codes, table 3, were identified from considering students' 4 responses as a group.

Code categories for grouped responses	Code Description
1. Environmental	References the environmental dimension of sustainability

focus and sustainable practice	only and likely to include simple environmentally focussed sustainable practices (eg. recycle). An example of a group of responses in this category is – recycling, solar power, reusing, reducing.
2. Environmental focus and sustainable practice with implied accountability	References the environmental dimension of sustainability only and likely to include simple sustainable practices (eg. recycle). Reference is made, in some way, to the future and/or some other sense of responsibility/accountability (eg. respect, coexisting). An example of a group of responses in this category is - constant, environmental, future, recyclable.
3. Environmental focus with professionally relevance and basic sustainable practices referenced	Environmentally focussed and likely to include simple sustainable practices plus some reference suggesting professional relevance (eg. Zero waste, slow design, life cycle, cycle to cycle as design strategies). An example of a group of responses in this category is - environmental conscious/aware, recycle-able/re-useable, longevity of product/design, essential!
4. Two pillars	Broader than single environmental dimensions of sustainability. References more than one dimension of sustainability but not represented as holistic concept. May include simple sustainable practices and/or future or responsibility/ accountability references. An example of a group of responses in this category is - ethical , environment, future, efficiency.
5. Beyond two pillars	Sustainability is broader in concept and will refer to at least two dimensions of sustainability. It goes beyond simple sustainability practices and might include professional design. It is likely to include a reference to personal action or responsibility or commitment. An example of a group of responses in this category is – environment, responsibility, ethical, smart.

6. Holistic focus	Two or more of the 3 dimensions of sustainability are present. There is some concept linking these or suggesting interconnection, or there is specific reference to the interconnection of concepts (holistic, systematic, and integrated). It is likely to include a reference to personal action or responsibility. There may be linkages to sustainable practices and professional relevance. An example of a group of responses in this category is - holistic, innovative, ethical, living.
7. Accountability	Focus is on accountability but no clear reference to the dimensions of sustainability is made. An example of a group of responses in this category is – responsibility, knowledge, future, important.

Table 3.

The representations of sustainability perceptions become more complex and sophisticated from code 1 to code 7, where code 7 is the most complex representation of sustainability.

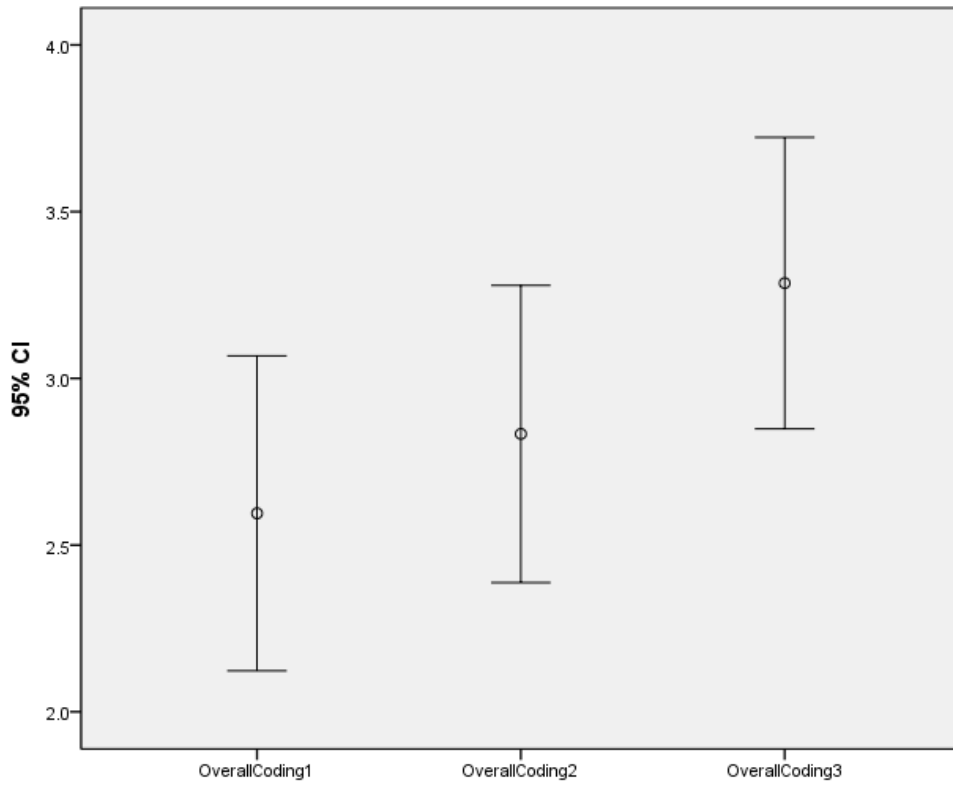
Coding 2 Results

This coding provided a means of comparing individual student's shift. That is the type of change from survey 1, to survey 2, to survey 3 can be compared. This was done for all students who had completed Q 6 in all three surveys. The degree of change for students was measured. A degree of change of "1" means the student moved one code level in a positive direction; from code 1 to code 2, or code 5 to code 6 for example. A change of "-2" means the student moved one code level in a negative direction; for example from code 4 to code 2 or code 5 to code 3.

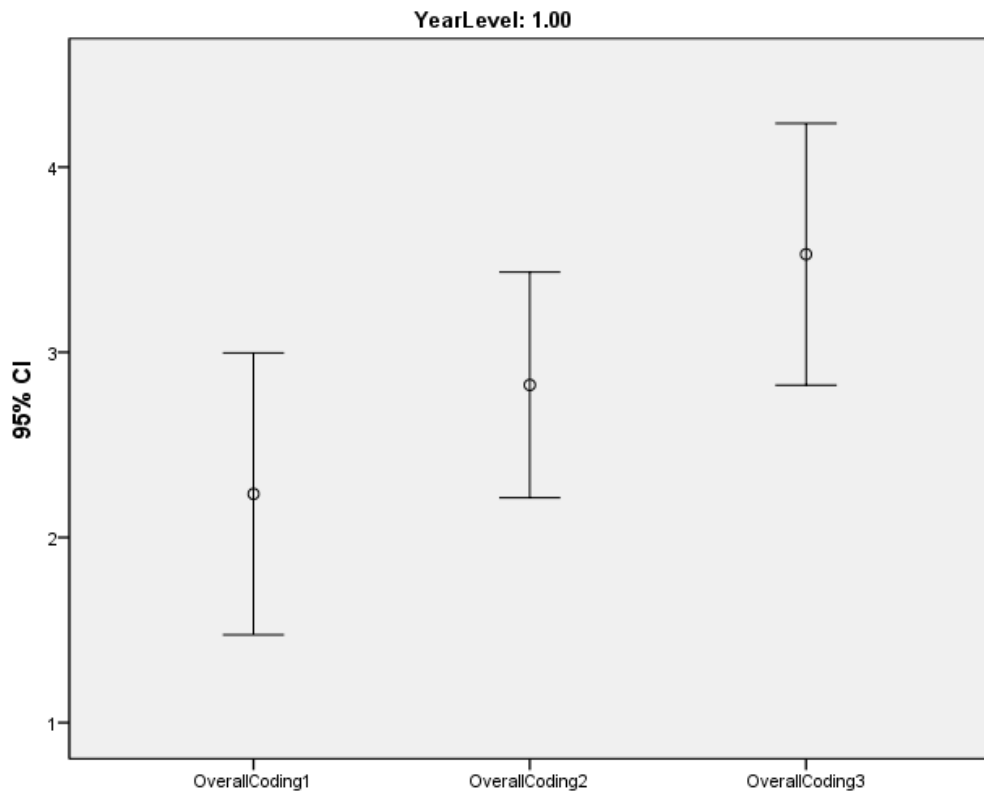
The mean of overall code and degree of change was aggregated within year levels with the results as presented in graphs 1- 6 below.

Graph 1	mean of coding scores for all students with 95% confidence intervals
Graph 2	mean of coding scores for 1st year students with 95% confidence intervals
Graph 3	mean of coding scores for 2nd year students with 95% confidence intervals
Graph 4	mean of coding scores for 3 rd year students with 95% confidence intervals
Graph 5	mean of change of code for 1 st years
Graph 6	mean of change of code for 2nd years

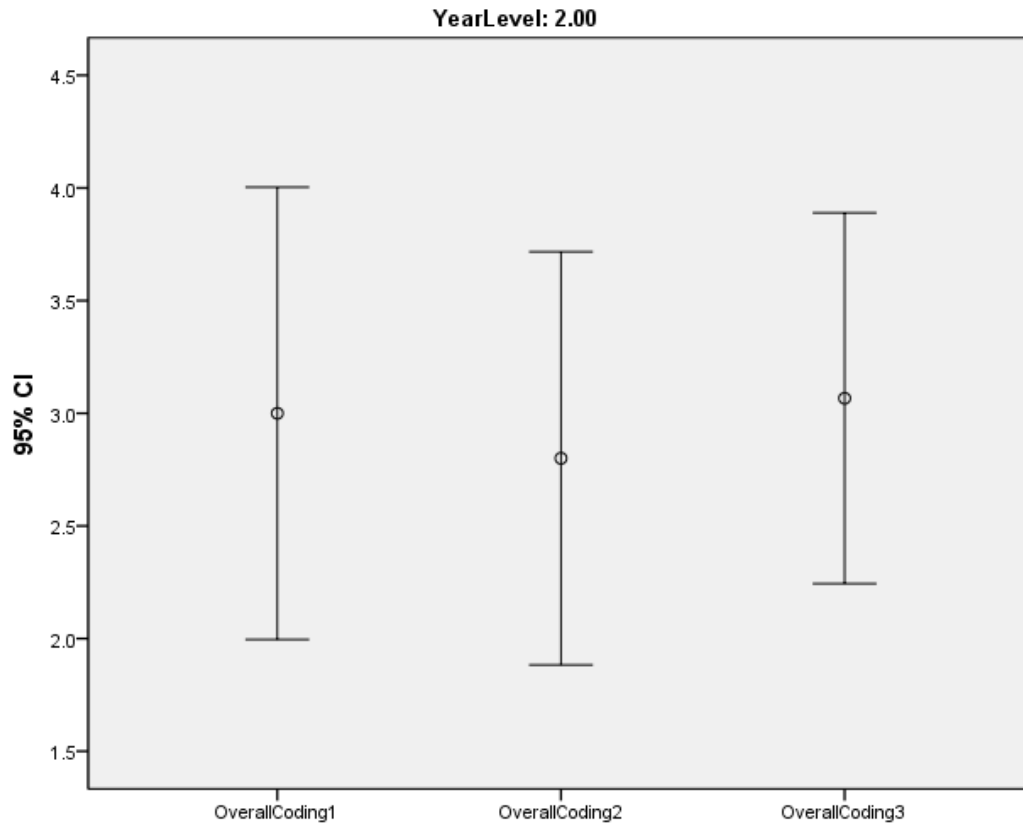
Graph 7 | mean of change of code for 3rd years



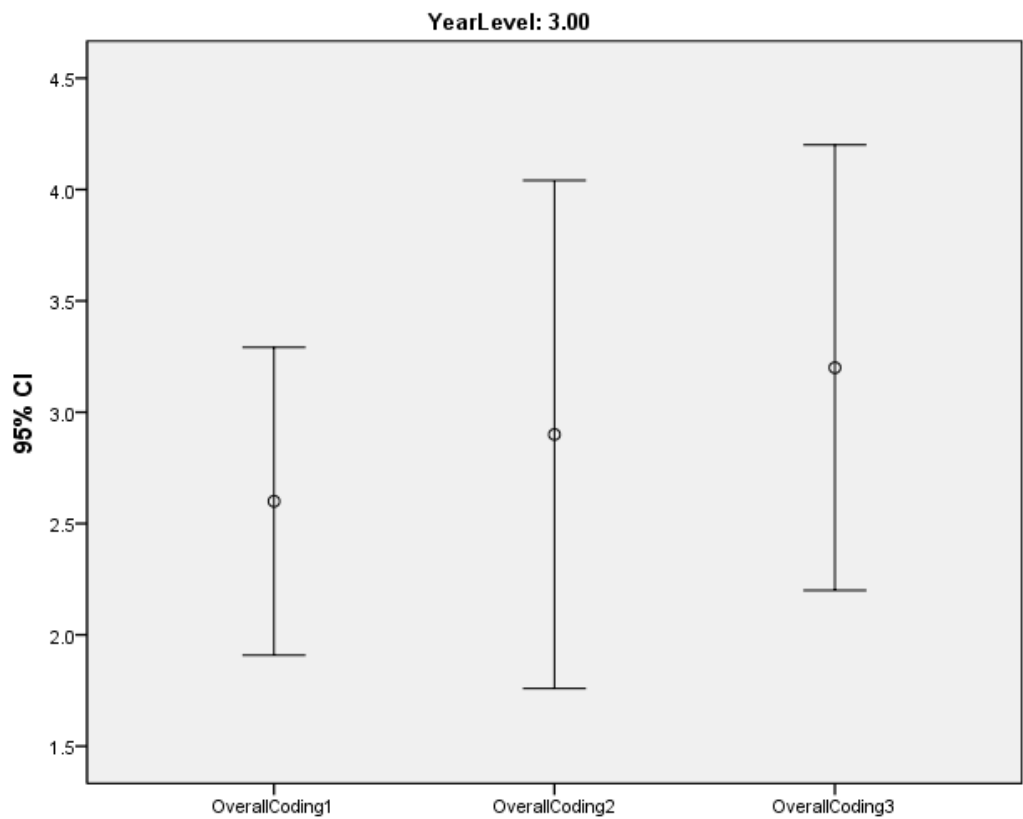
Graph 1. mean of coding scores for all students with 95% confidence intervals



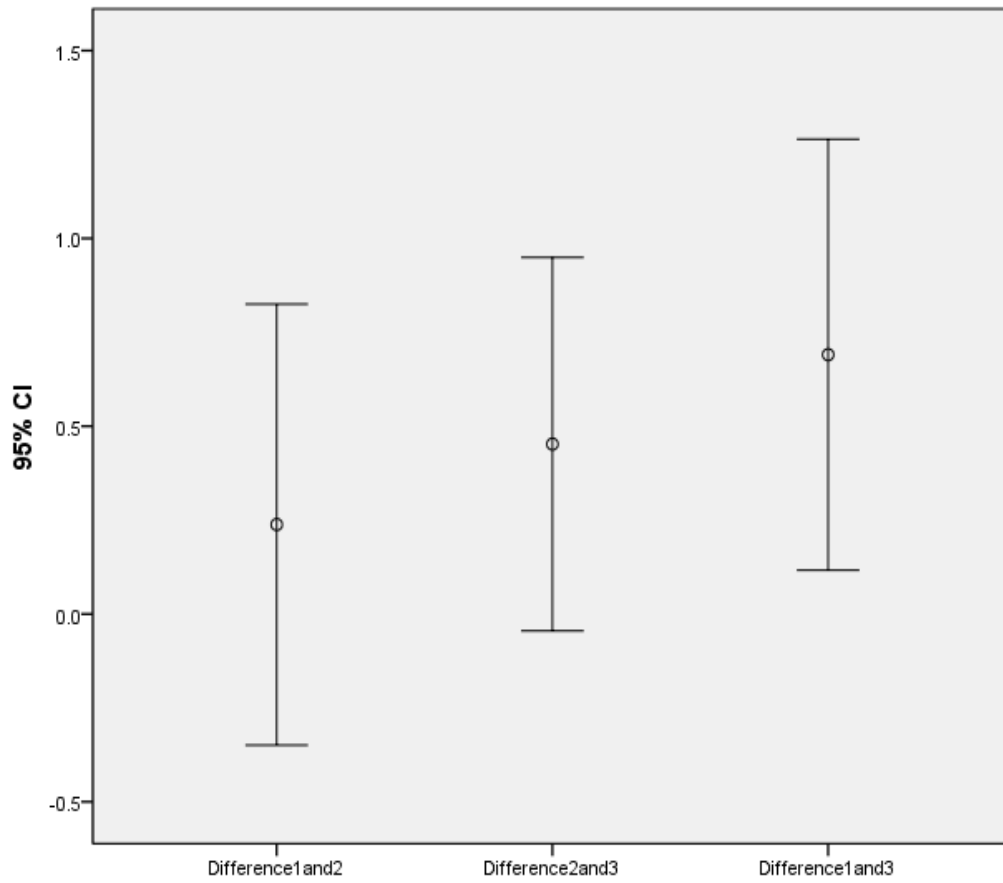
Graph 2. mean of coding scores for 1st year students with 95% confidence intervals



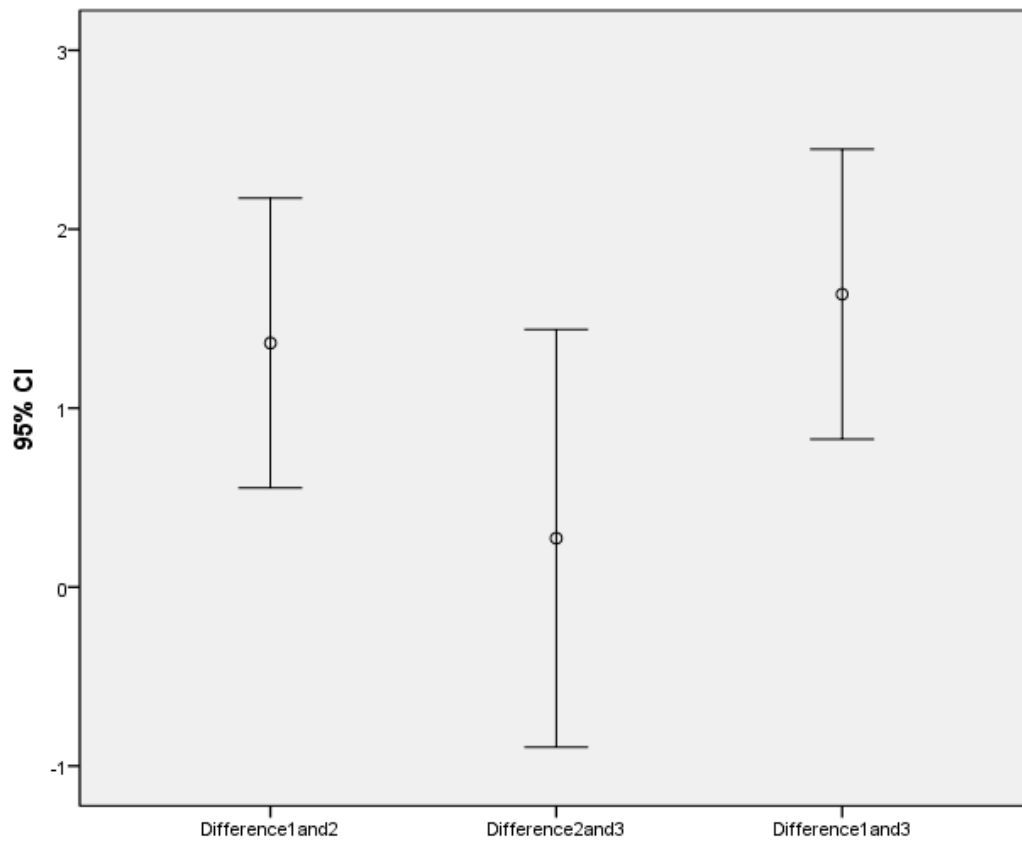
Graph 3. Mean of coding scores for 2nd year students with 95% confidence intervals



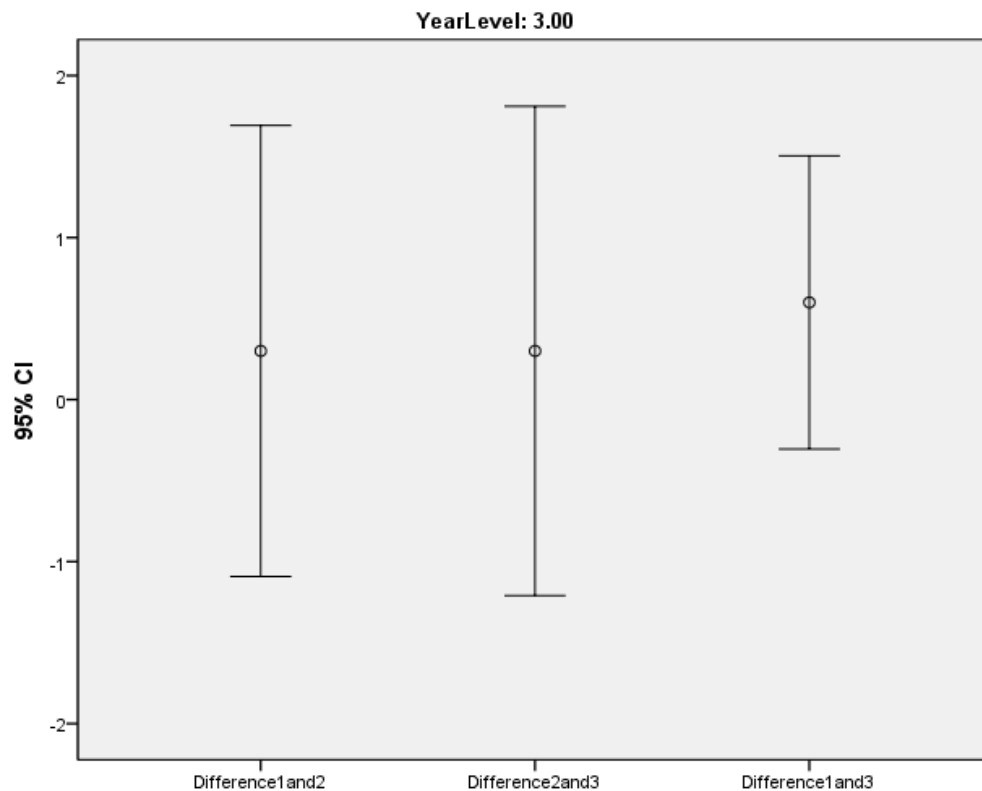
Graph 4. mean of coding scores for 3rd year students with 95% confidence intervals



Graph 5. mean of change of code for 1st years



Graph 6. mean of change of code for 2nd years



Graph 7. mean of change of code for 3rd years

Coding 2 findings

From Graph 1, we see that overall students' responses become more sophisticated over time. From Comparing Graphs 2, 3, and 4 we see that all year levels shift in sophistication over the year. First years shift the most in a steady way over the year from a lower base. Second years go backwards a little in the middle of the year but show a slight shift. Third years have a steady shift but not as dramatically as first years. All year levels tend towards code 3 (**Environmental focus with professionally relevance and basic sustainable practices referenced**) at the end of the year.

Graphs 5-7 show the extent of shift. Graph 5 shows that all first year students have moved positively between survey 1 and 3. Graph 6 shows that most second years have moved positively and perhaps to a greater extent than first year. Graph 7 shows third years have moved least, if at all.

Appendix F – Student survey – summary of results for Question 7

Data Analysis of Student Survey Question 7

Question 7 of the student survey included 27 statement items where students were invited to show the extent to which they agreed or disagreed with each statement using a five point Likert Scale (1 = strongly disagree, 5= strongly agree). See table 1 for the list of statements.

Results

The following graphs show the summarised survey results of question 7, items 1-27. Each shows the mean aggregated score for each year level at three time points (start sem1, end sem 2, and end sem 3 in 2010).

The vertical axes show the mean response of students to that item. Note that the values on the vertical axes vary from graph to graph. The higher the mean on the graph, the more strongly the students' responses aligned with a pro sustainability attitude or belief. The results for items which were negative in relation to sustainability practices have been reversed (see table 1). For instance, item 7.6 "As an individual I can't do much about climate change" is negative and all results were reversed in the statistical analysis. That is, a strongly disagree became a 5, a strongly agree became a 1.

On the horizontal axis, "survey administration" refers to the three times the survey was done by students.

Each graph includes 95% confidence intervals; that is 95% of the students provided responses which fell within these intervals. The wider the confidence intervals, the greater the variability in responses from students.

In addition, there are a number of graphs showing mean aggregated scores for specific themes, Head, Heart, Hands, internal and external responsibility. The scores for selected items are aggregated according to table 1. For instance, the Hands graph is the mean of aggregated results for items relating to skill statements (I can or I do...) - Items 2, 6(rev), 8 for the three year levels over the three surveys.

Reading the graphs – as an example, graph 7.1 shows that first years have gone from approximately 4 (agreeing) to 4.5 (agreeing more strongly). That is a shift of 10% approximately. For this item, third years were relatively static around 4.6 (between agree and strongly agree).

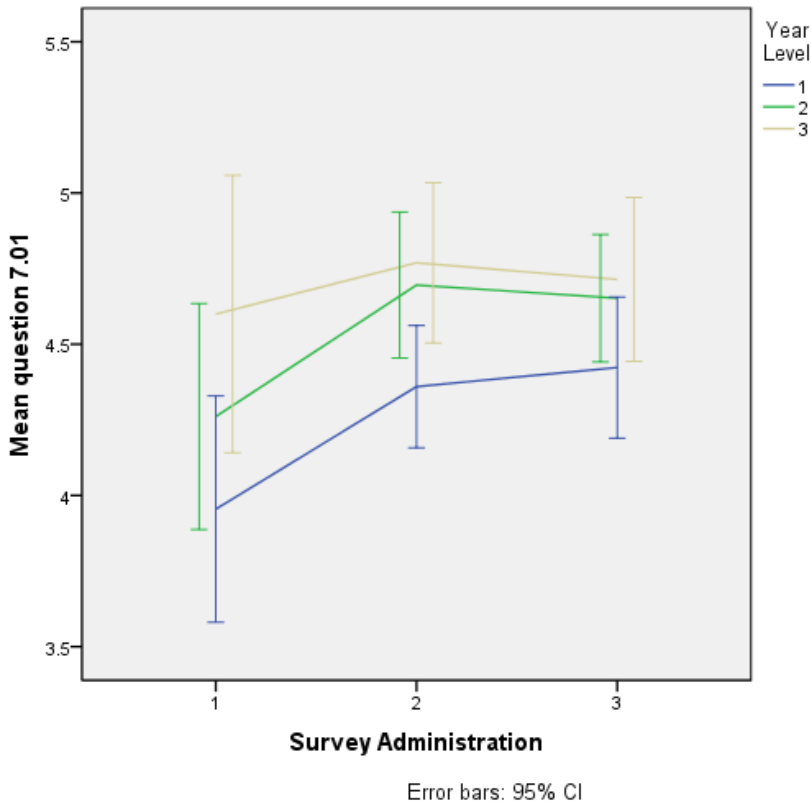
Findings and discussion – A statistical factor analysis was completed across the responses to the 27 items. No factors or relationships between items were identified. This might have resulted from a skewing effect caused by so many items dealing with ‘head’ questions. The significance of this is that students might

The statistical analysis suggests that student responses are dependent on both student year level and the timing of the survey. This suggests that the students’ responses are influenced by what they are studying at particular times in the year (i.e. in specific courses). Overall, the results show that more powerful sustainability related learning occurred for first year students.

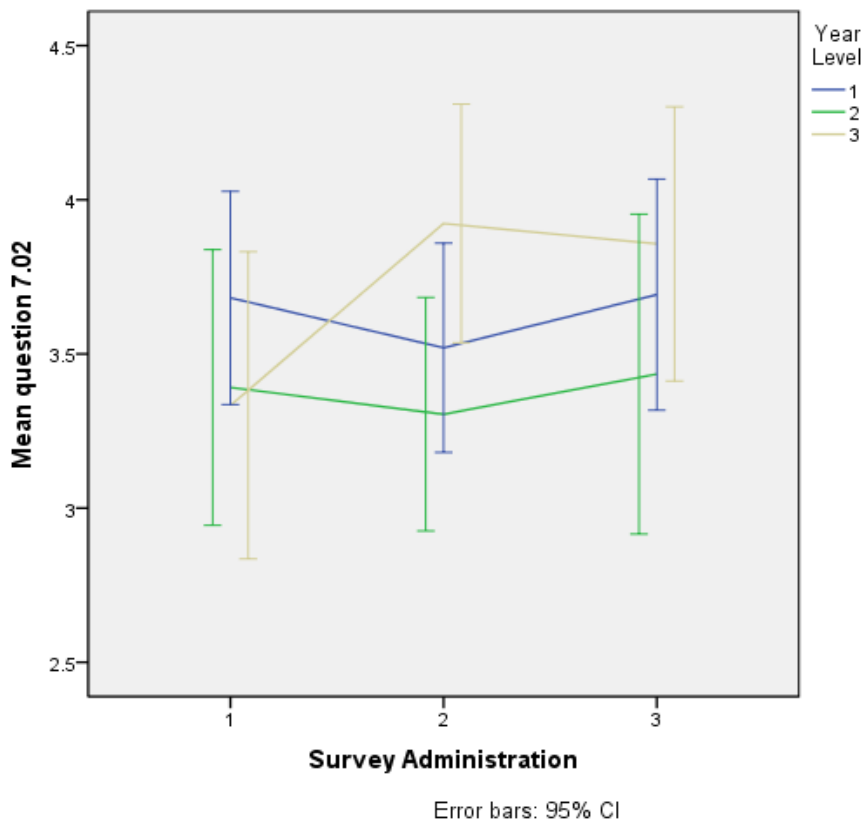
Student survey questions(7.1-7.27) with Likert scale (SD, D, N, A, SA) responses	Question alignment sustainable beliefs and practices	Head Heart Hand	External / Internal responsibility focus
1. I am familiar with the term sustainability	+	Head	In
2. I avoid buying from a company which shows no concern for the environment	+	Hand	In
3. Climate change will not impact on my future	–	Head (heart)	In
4. RMIT University should strongly support and celebrate cultural, religious and linguistic diversity among students and staff	+	Heart	Ex
5. A dynamic society based on competition is most preferable	–	Heart	Ex
6. As an individual I can't do much about climate change	–	Hand	In
7. It is imperative to learn from cultures where people live more harmoniously with nature	+	Heart (Hand)	Ex
8. If I had the opportunity my clothes would all be made using sustainable methods and materials	+	Hand	In
9. We, as a society should radically change our way of living to offset climate change	+	Heart	Ex
10. The earth has plenty of natural resources for future generations	–	Head	Ex
11. Non-human animals have rights	+	Heart	Ex

Student survey questions(7.1-7.27) with Likert scale (SD, D, N, A, SA) responses	Question alignment sustainable beliefs and practices	Head Heart Hand	External / Internal responsibility focus
12. RMIT University should only purchase fair trade products where such products exist	+	Heart	Ex
13. I have the knowledge to justify added cost of sustainable features to clients	+	Head	In
14. Australia should maintain high and stable levels of economic growth, even if it disregards the environment	-	Heart	Ex
15. I feel I could manage a custom made xxxx design project using sustainable products and methods	+	Heart	In
16. I have a responsibility to act to support a more sustainable future	+	Heart	In
17. The cafeterias at RMIT should only use locally produced foods	+	Heart	Ex
18. The so-called 'ecological crisis' facing human beings has been greatly exaggerated	-	Head	Ex
19. I am concerned about climate change	+	Heart	In
20. I feel I could manage a mass market/commercial xxxx design project using sustainable methods and products	+	Heart	In
21. The City of Melbourne should ensure socially inclusive (available to everyone) public transportation	+	Heart	Ex
22. I feel green organizations/certification will solve environmental issues in design	+	Heart	Ex
23. If asked, I could direct a client to a business or enterprise that adopts sustainable xxxx design practices	+	Head	In
24. I feel using sustainable practices in design is the only option	+	Heart	In
25. I think "Cradle to Cradle" principles and practices should be required in the xxxx design program	+	Heart(head)	Ex
26. Xxxx design based on sustainable design principles can have an impact on climate change issues	+	Head	Ex
27. Learning about sustainability is relevant to my future as a xxxx designer	+	Heart	In

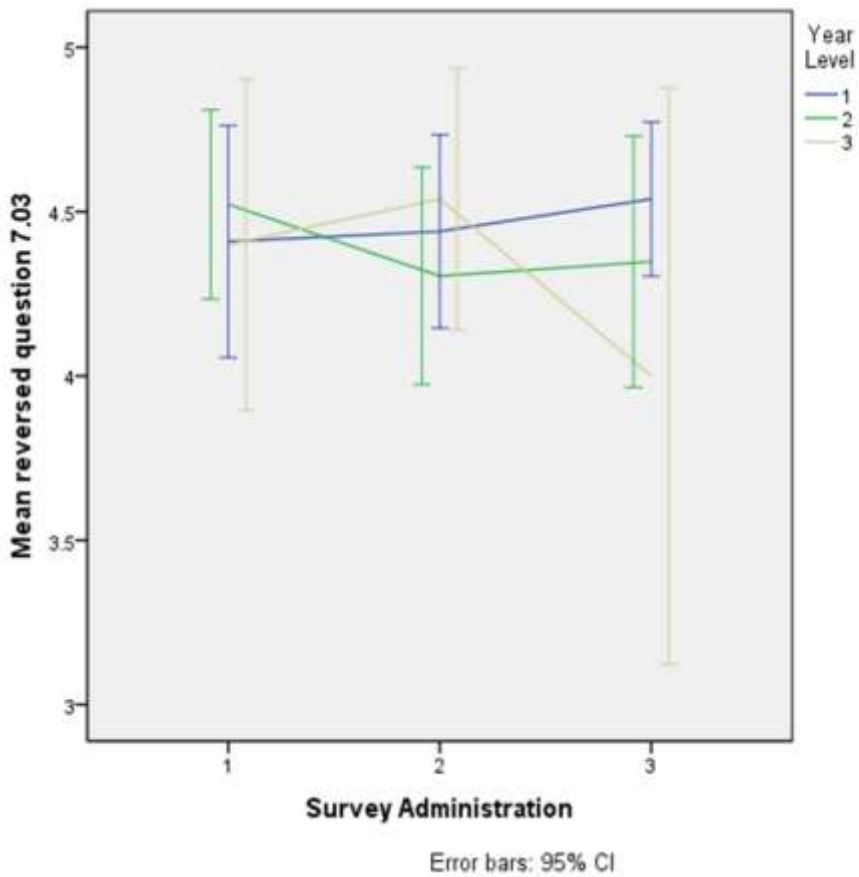
Table 1.



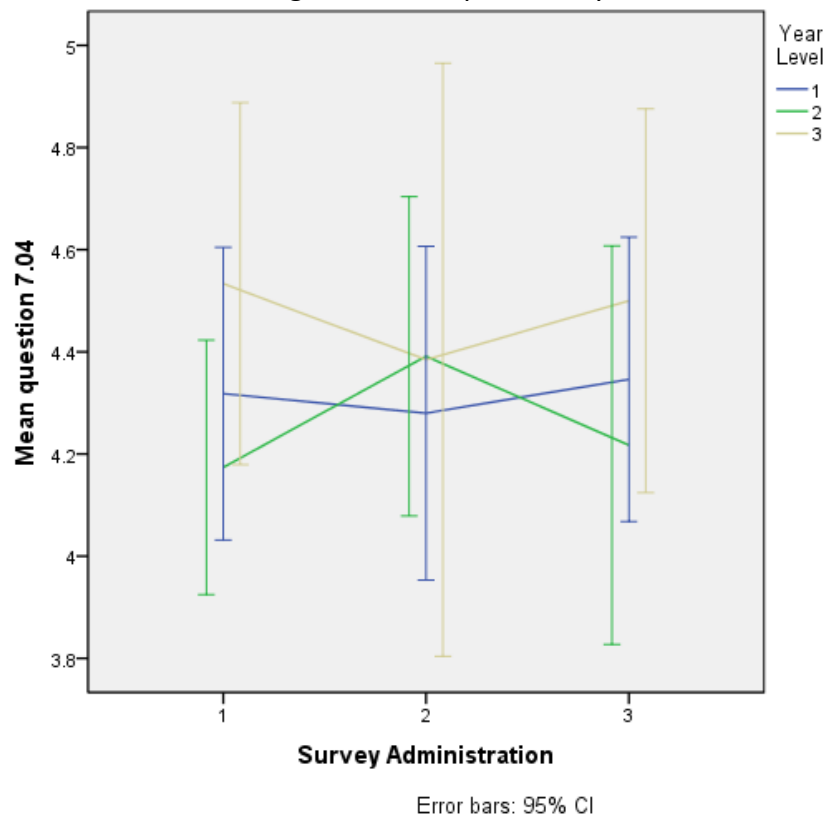
Item 7.1 - I am familiar with the term sustainability



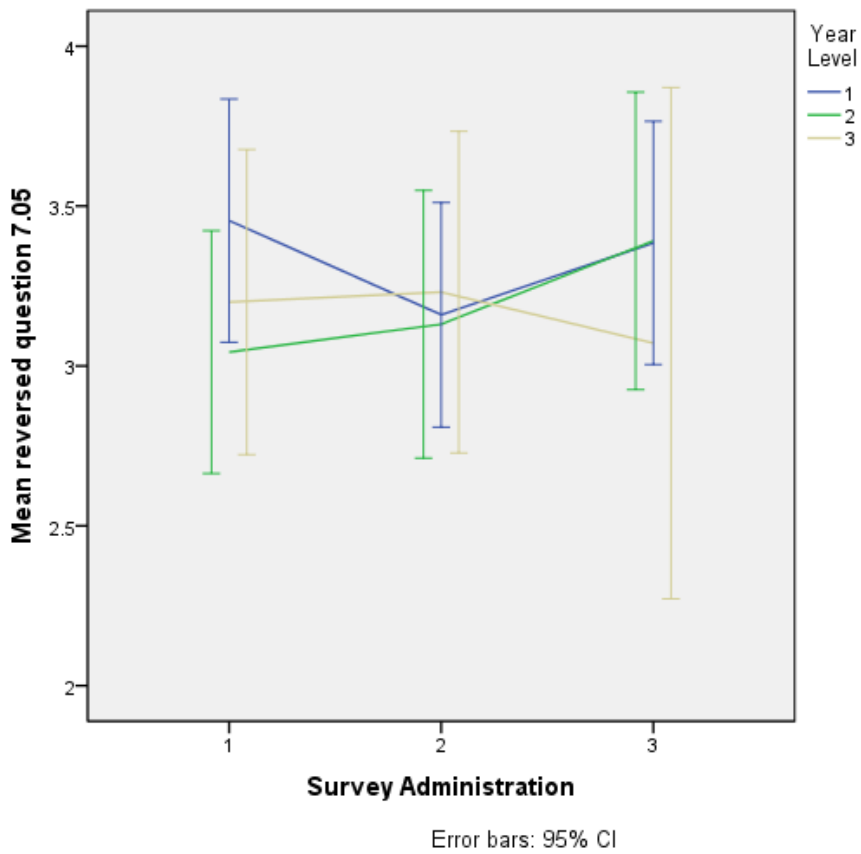
Item 7.2- I avoid buying from a company which shows no concern for the environment



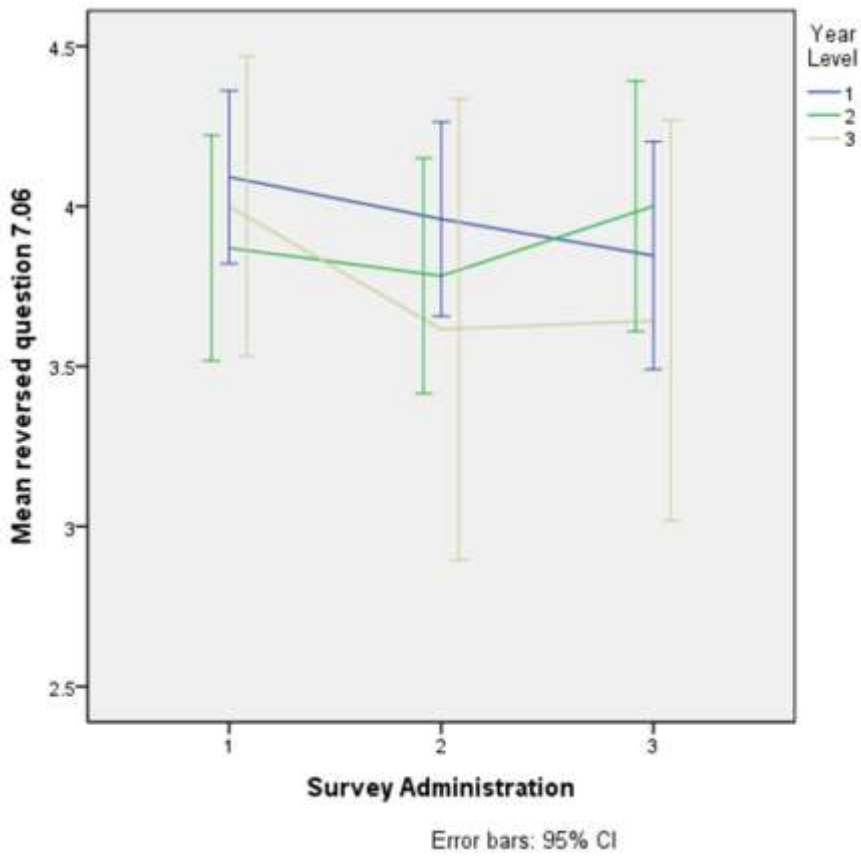
Item 7.3 - Climate change will not impact on my future



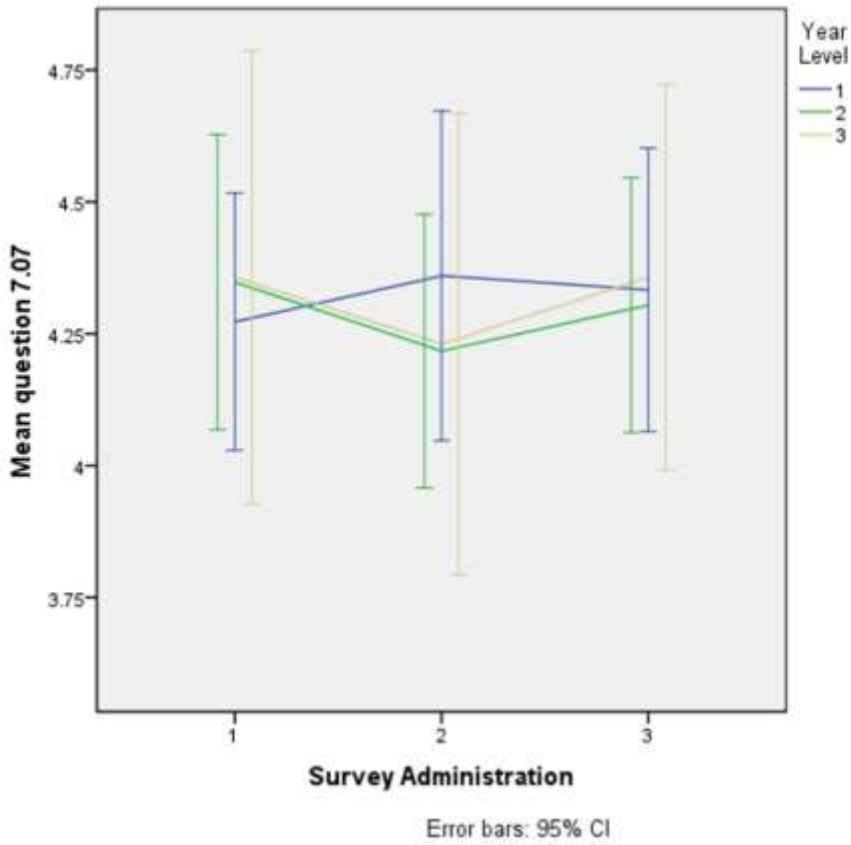
Item 7.4 - RMIT University should strongly support and celebrate cultural, religious and linguistic diversity among students and staff members



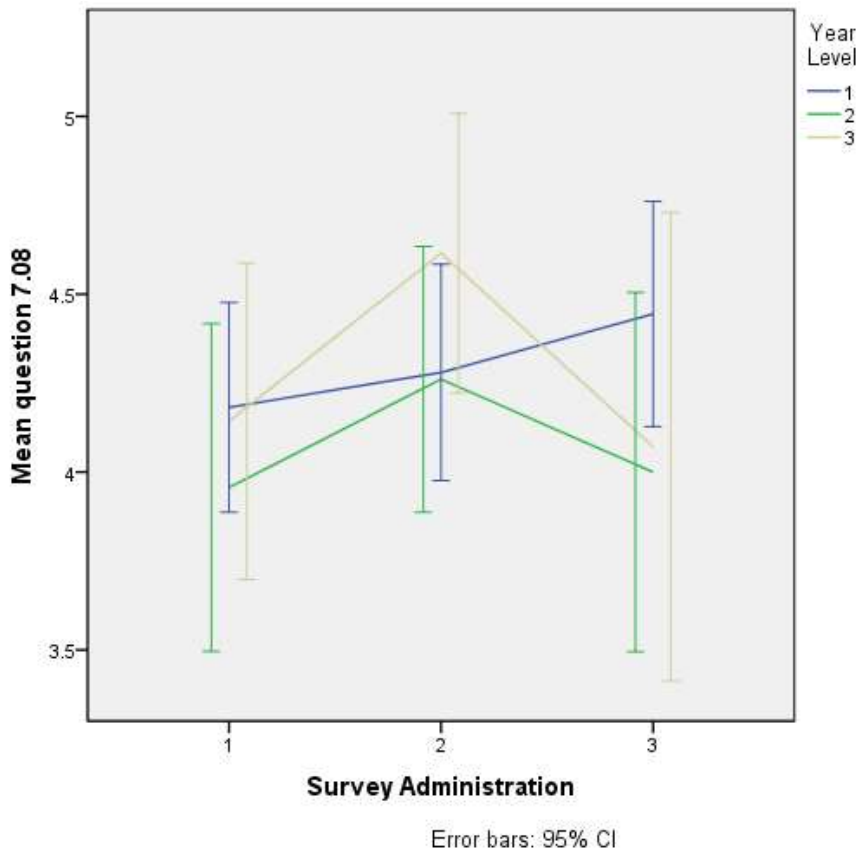
Item 7.5 - A dynamic society based on competition is most preferable



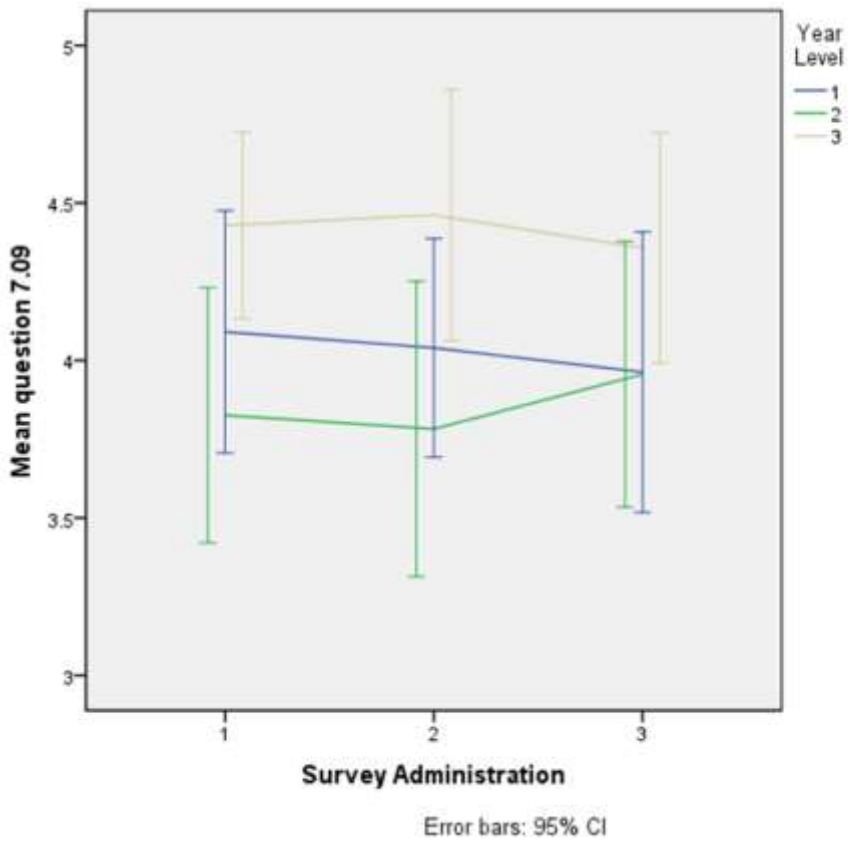
Item 7.6 - As an individual I can't do much about climate change



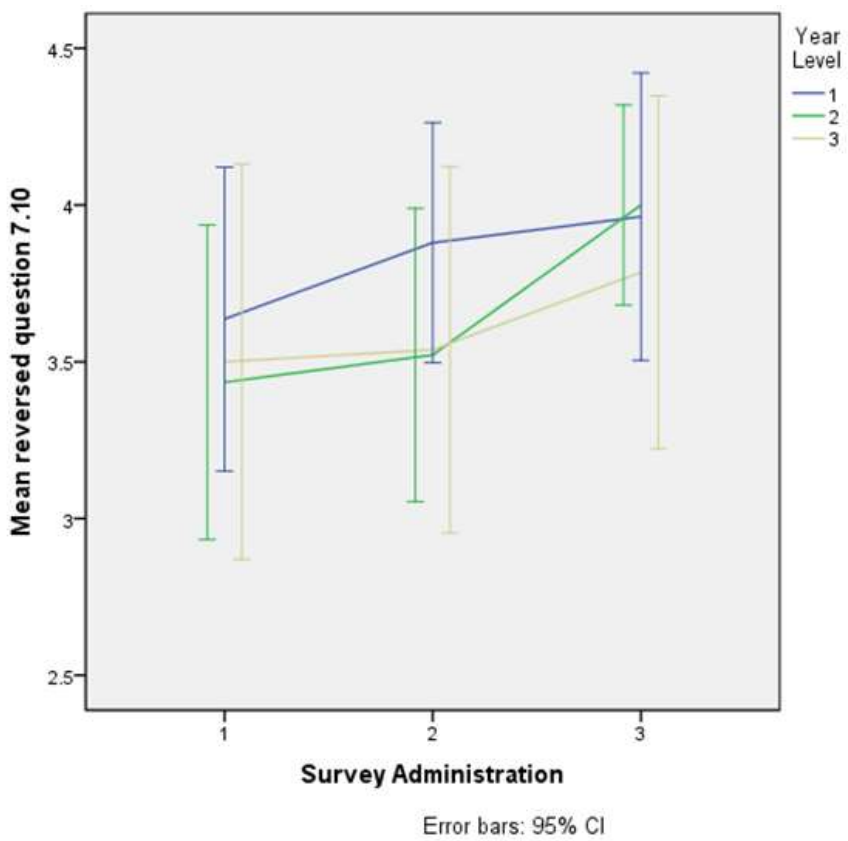
Item 7.7 - It is imperative to learn from cultures where people live more harmoniously with nature



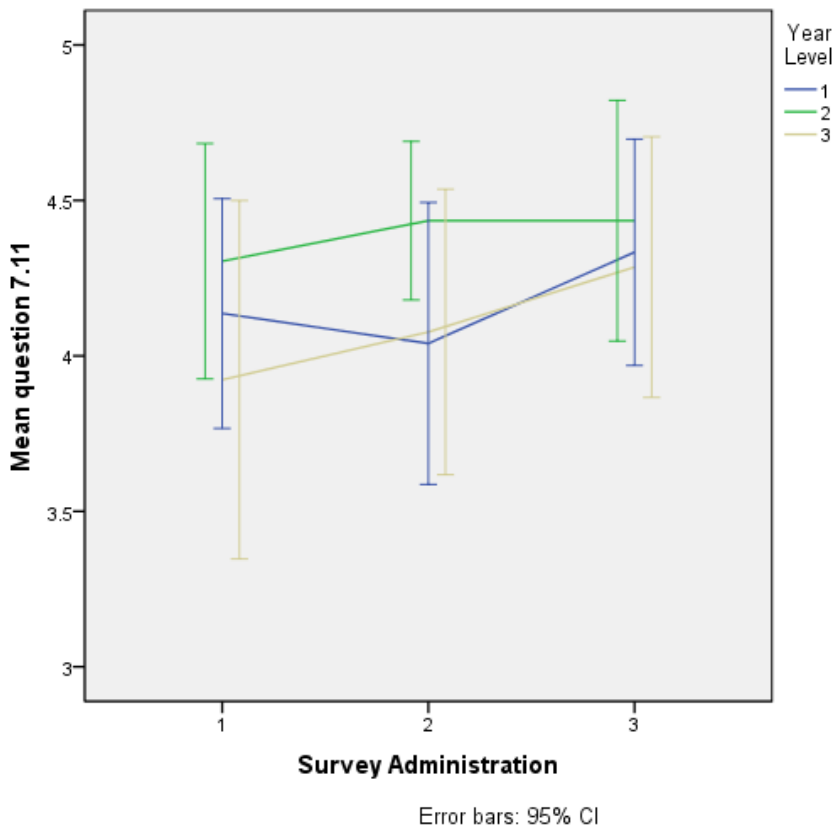
Item 7.8 - If I had the opportunity my clothes would all be made using sustainable methods and materials



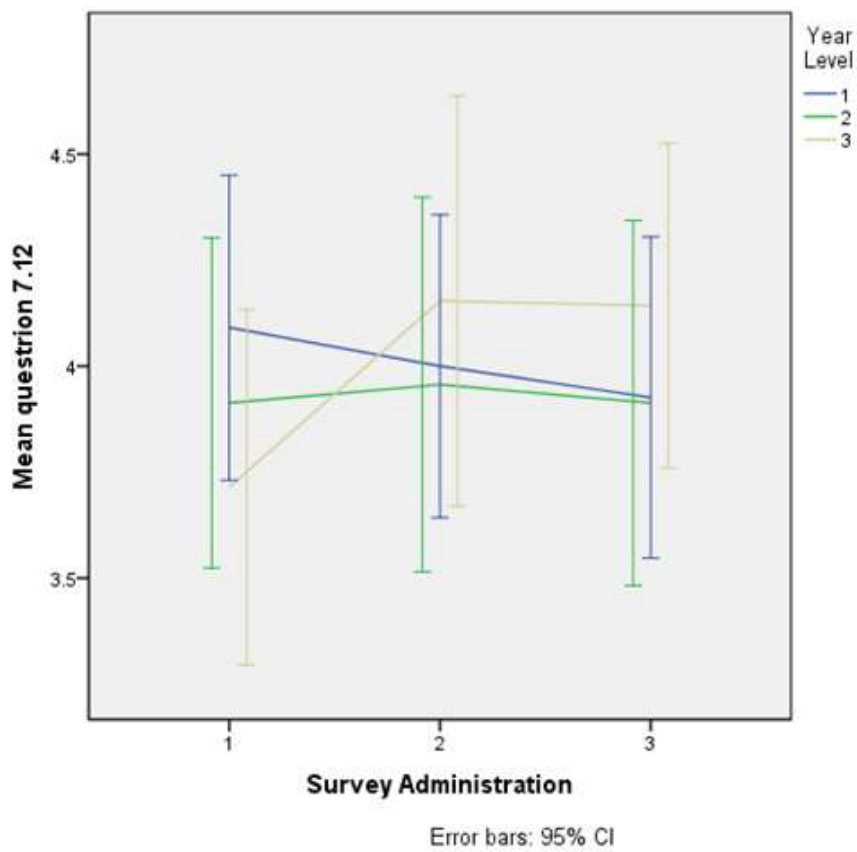
Item 7.9 - We, as a society should radically change our way of living to offset climate change



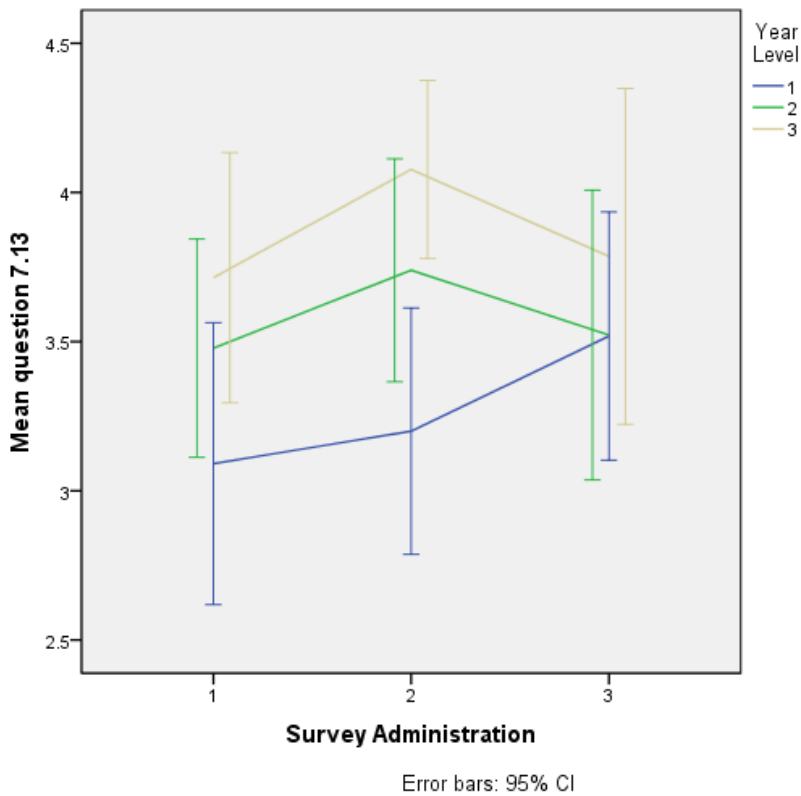
Item 7.10 - The earth has plenty of natural resources for future generations



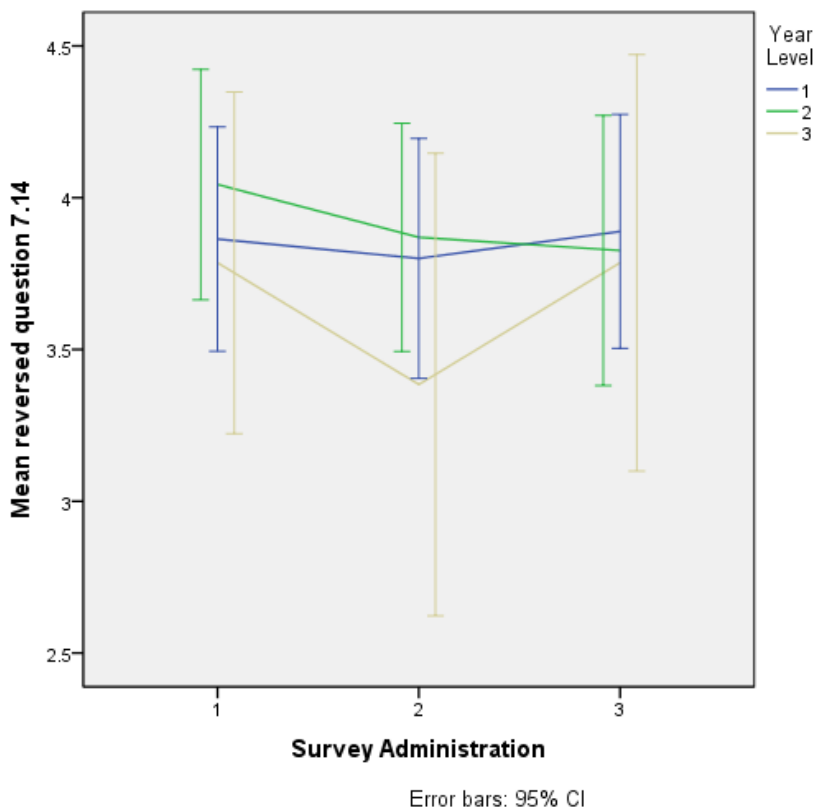
Item 7.11 - Non-human animals have rights



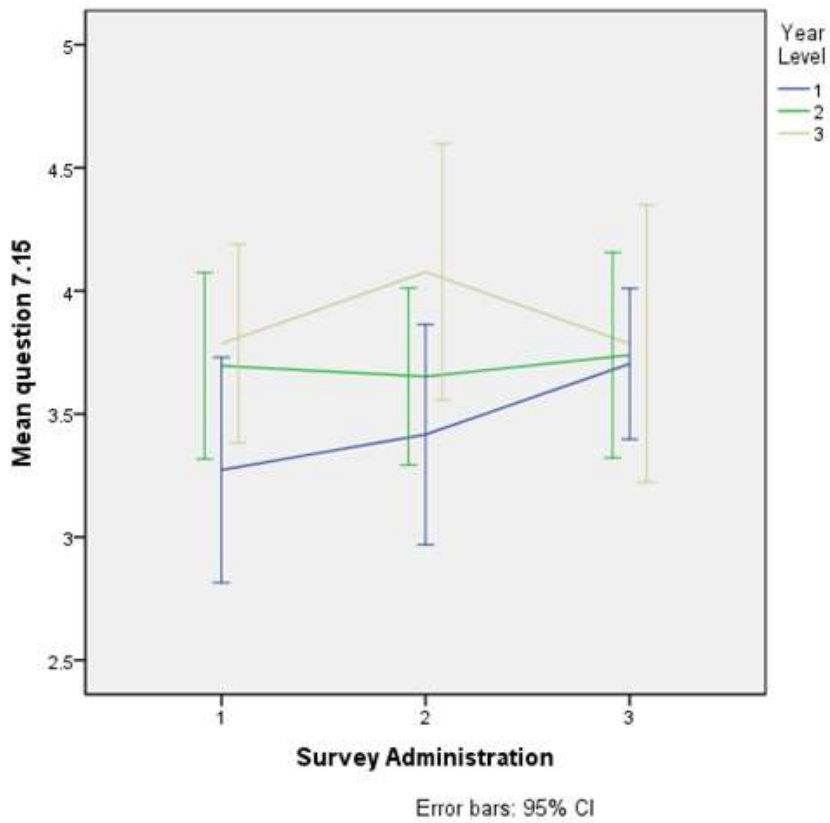
Item 7.12 - RMIT University should only purchase fair trade products where such products exist



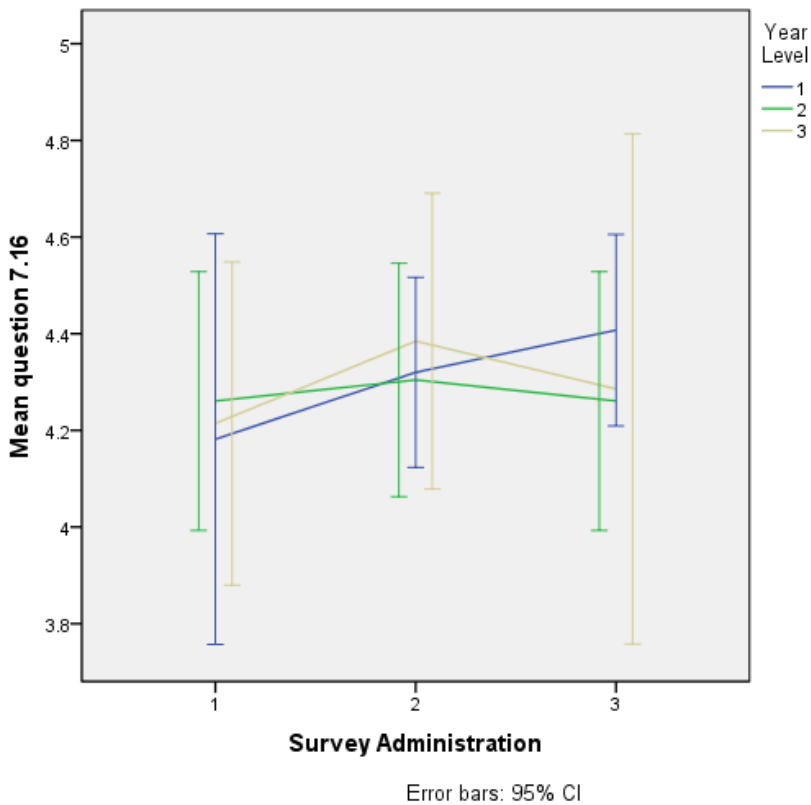
Item 7.13 - I have the knowledge to justify added cost of sustainable features to clients



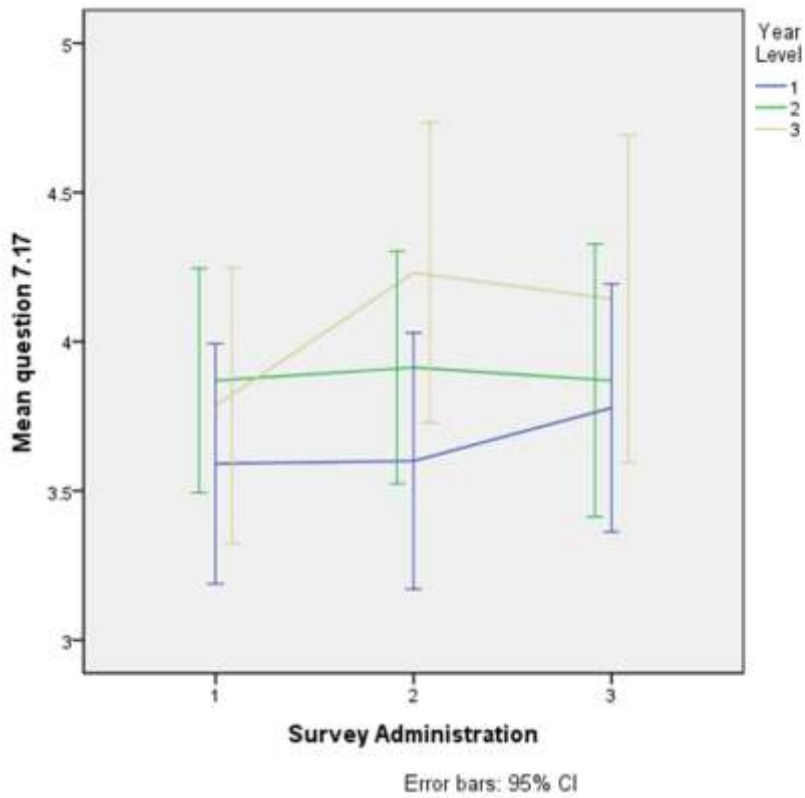
Item 7.14 - Australia should maintain high and stable levels of economic growth, even if it disregards the environment



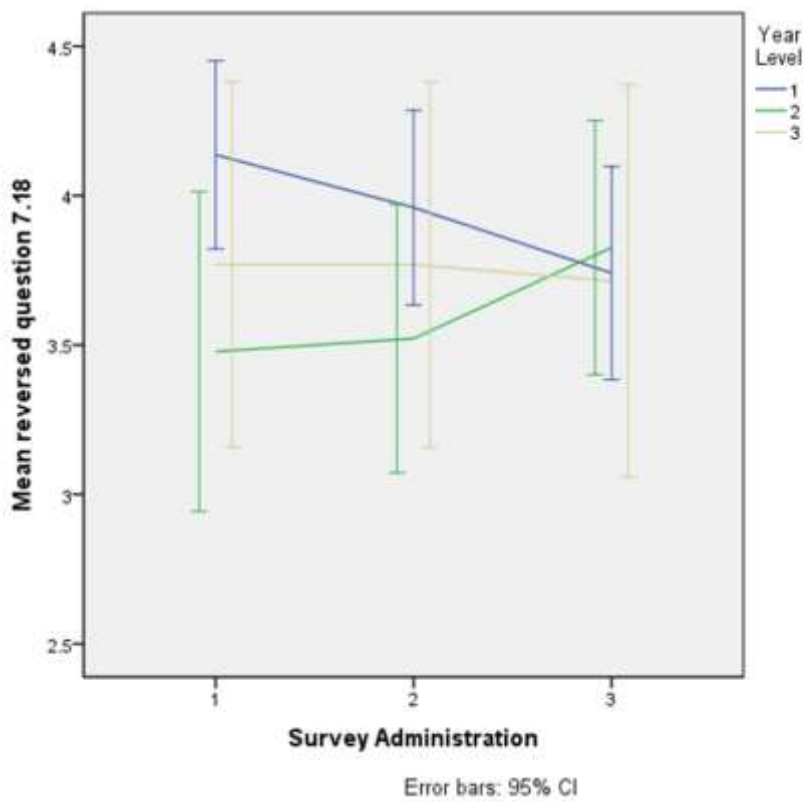
Item 7.15 - I feel I could manage a custom made textile design project using sustainable products and methods



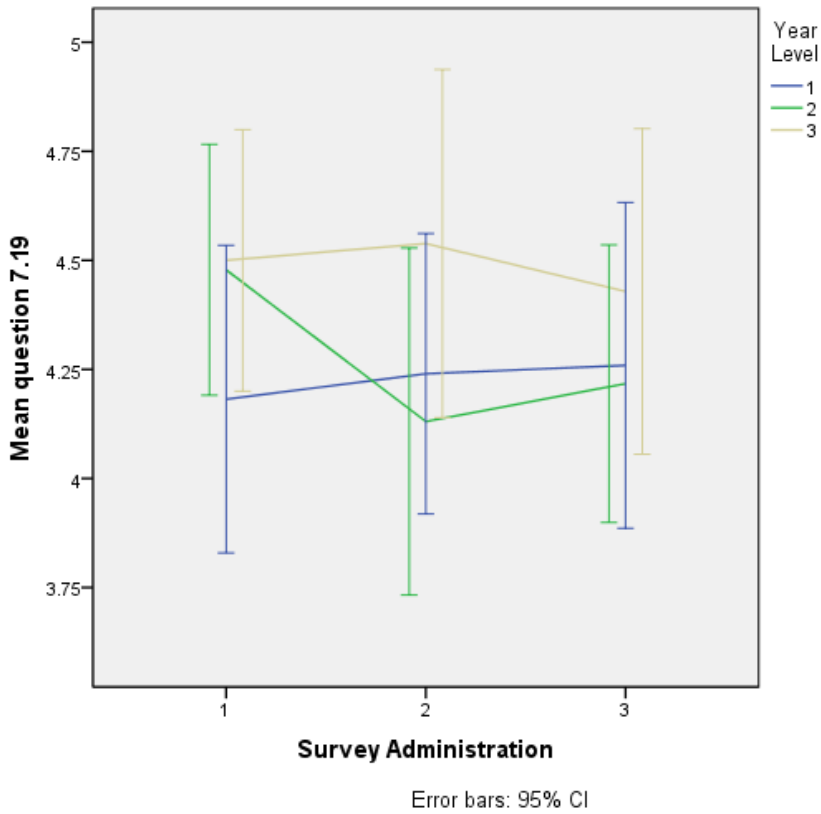
Item 7.16 - I have a responsibility to act to support a more sustainable future



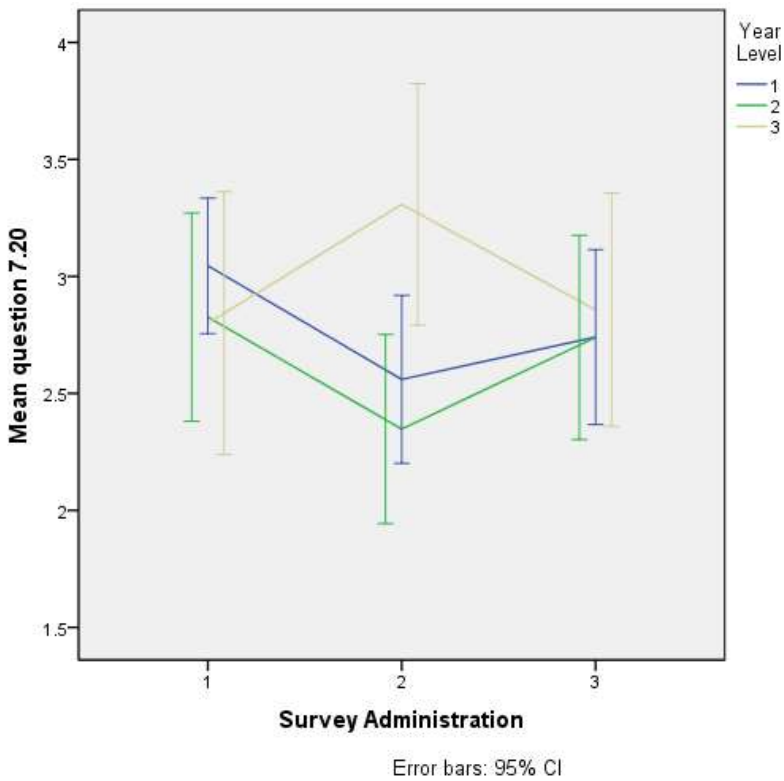
Item 7.17 - The cafeterias at RMIT should only use locally produced foods



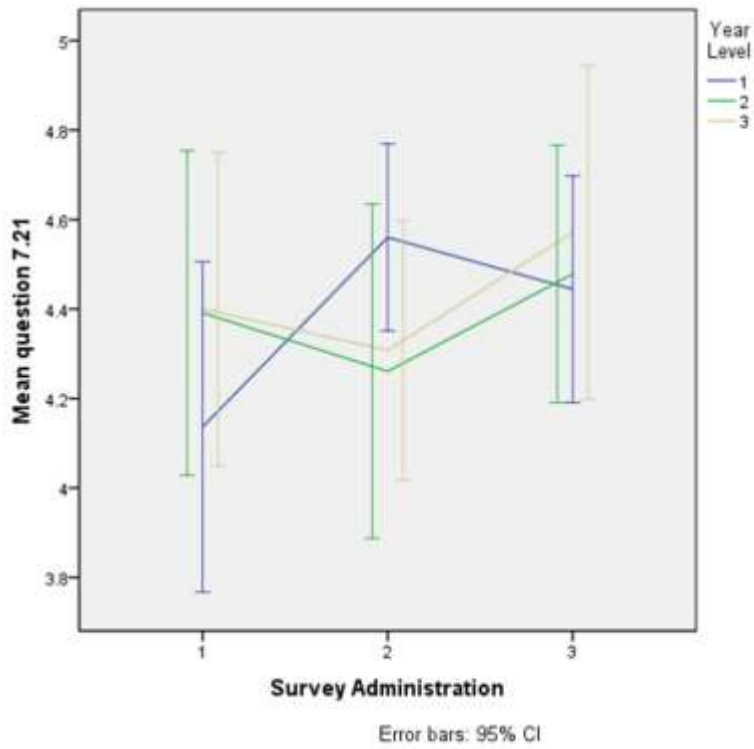
Item 7.18 - The so-called 'ecological crisis' facing human beings has been greatly exaggerated



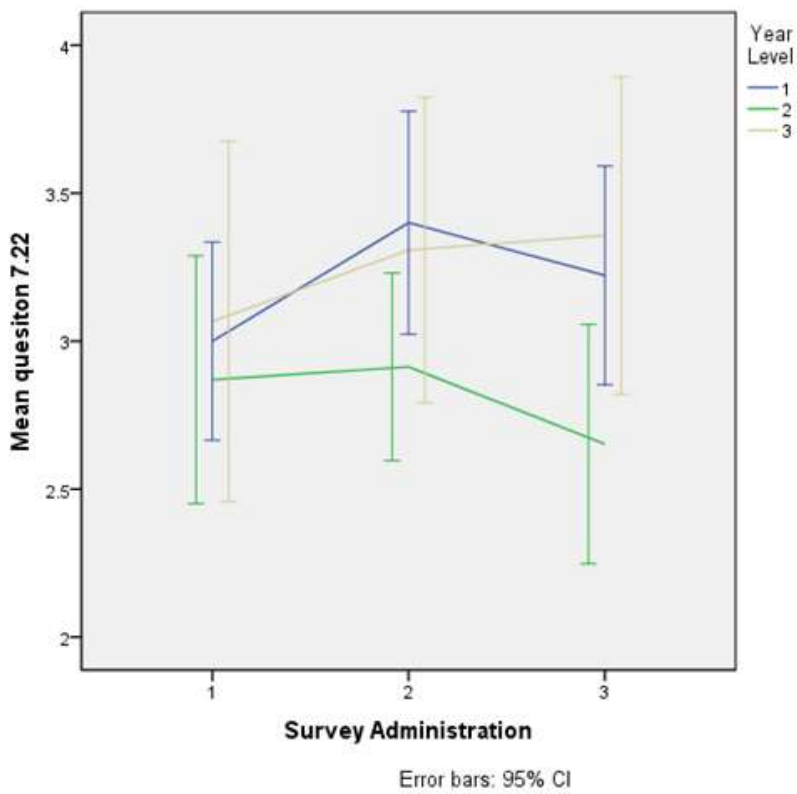
Item 7.19 - I am concerned about climate change



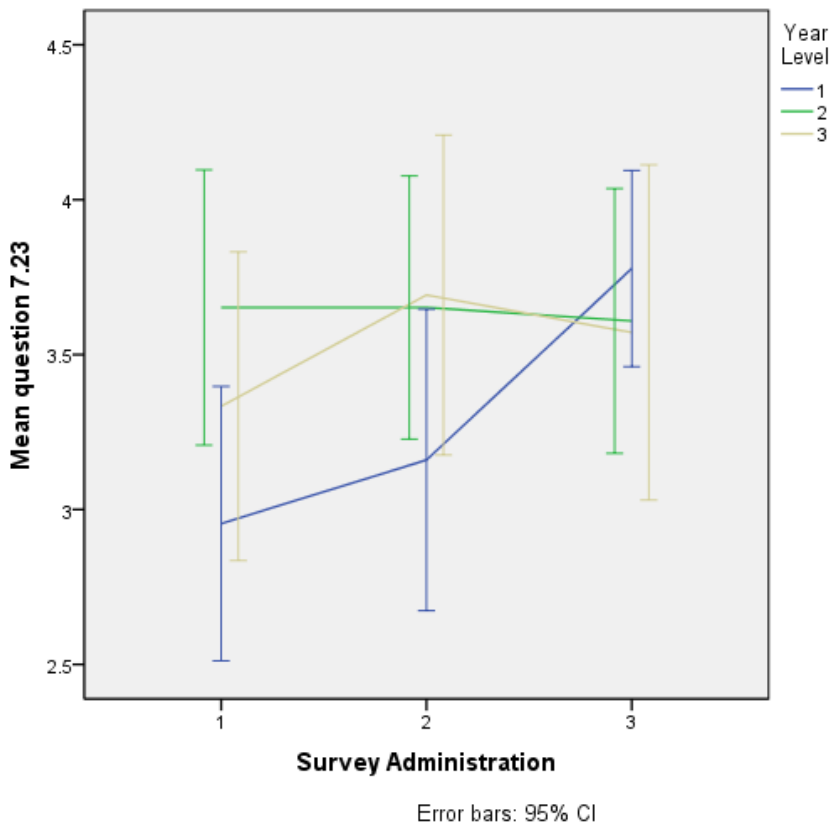
Item 7.20 - I feel I could manage a mass market/commercial textile design project using sustainable methods and products



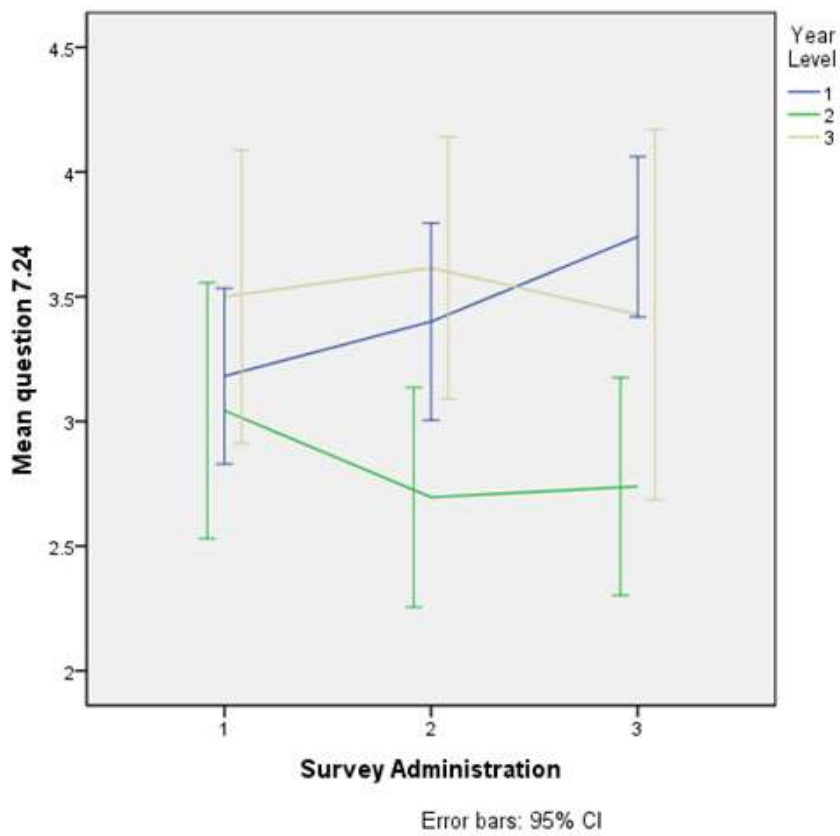
Item 7.21 - The City of Melbourne should ensure socially inclusive (available to everyone) public transportation



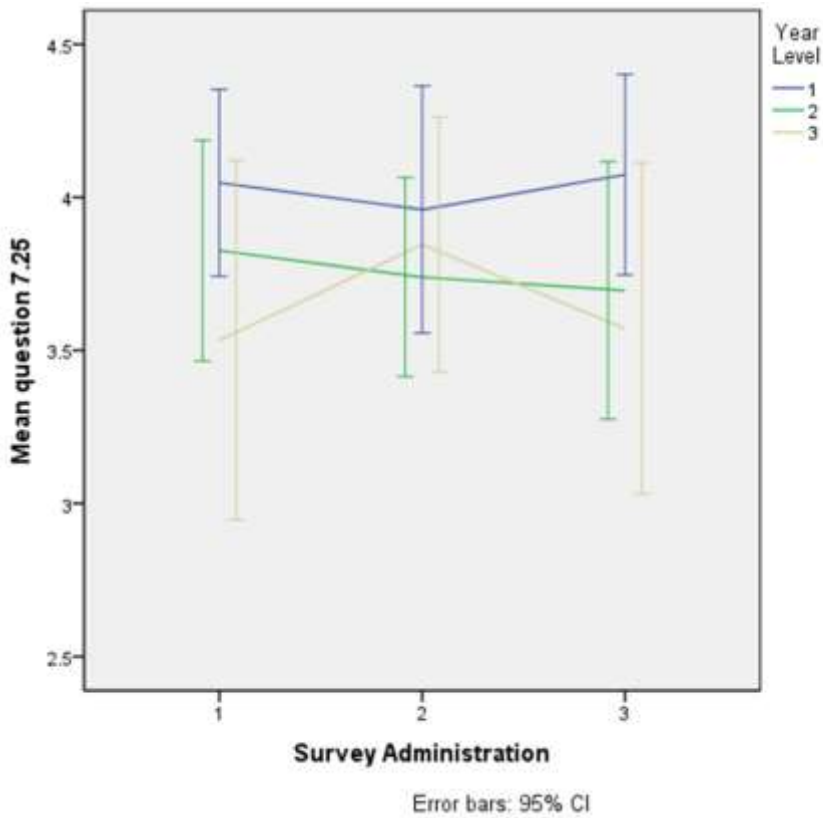
Item 7.22 - I feel green organizations/certification will solve environmental issues in design



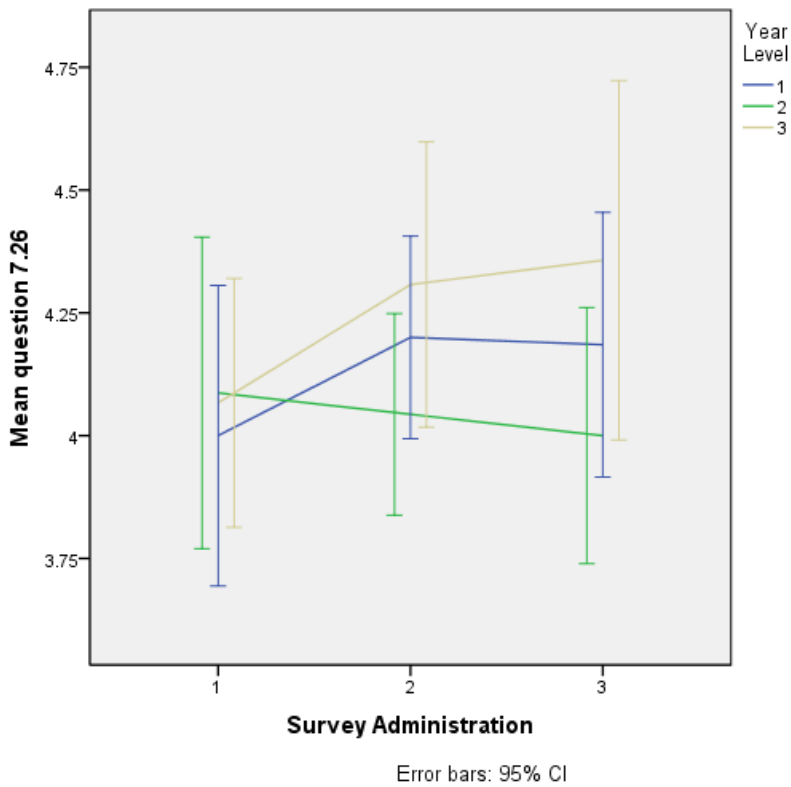
Item 7.23 - If asked, I could direct a client to a business or enterprise that adopts sustainable textile design practices



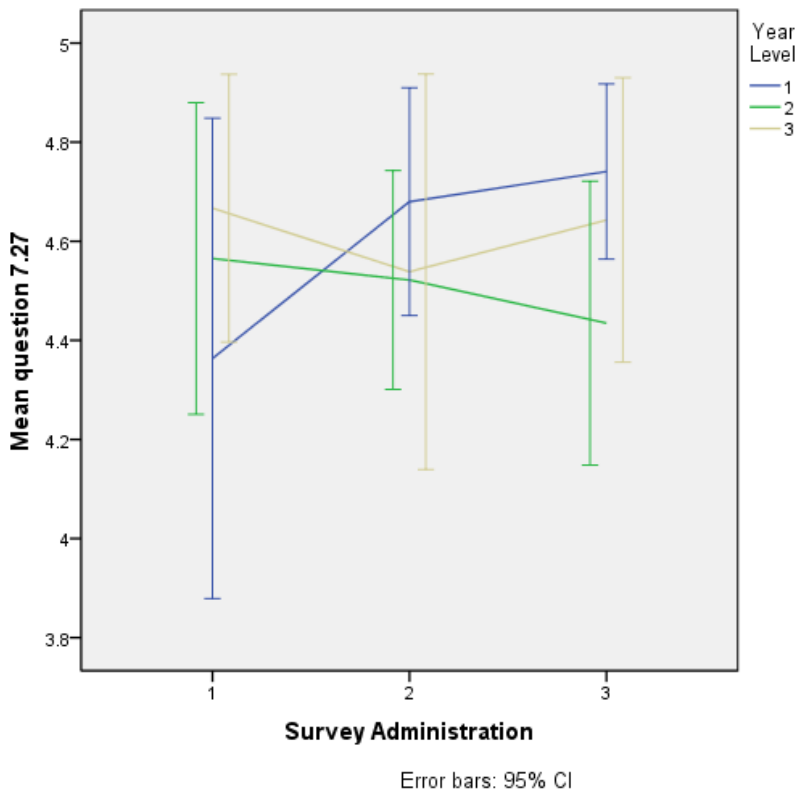
Item 7.24 - I feel using sustainable practices in design is the only option



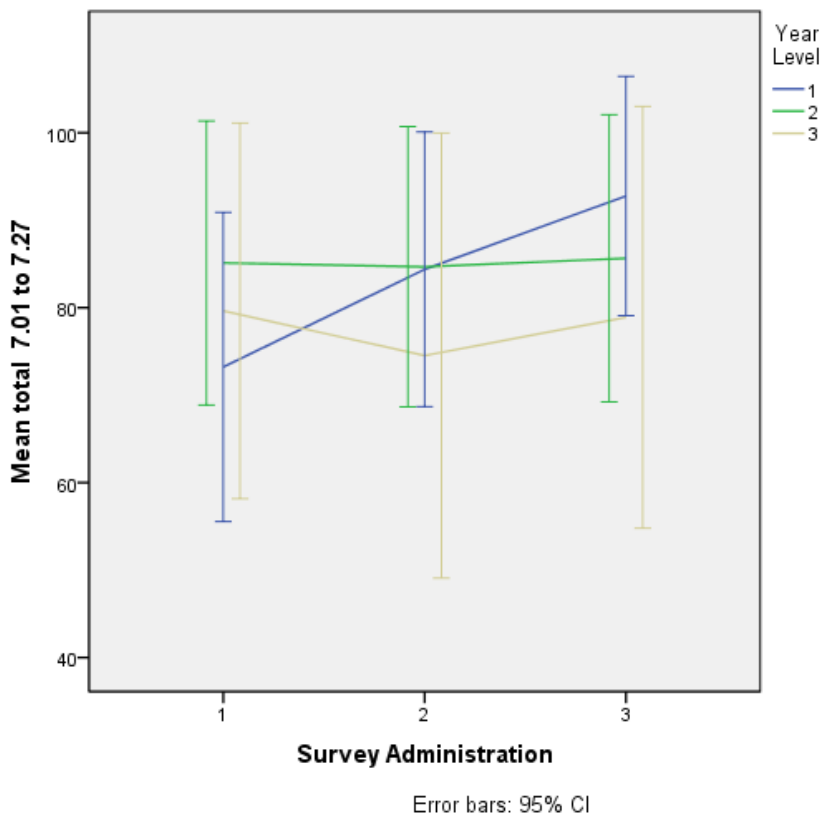
Item 7.25 - I think “Cradle to Cradle” principles and practices should be required in the textile design program



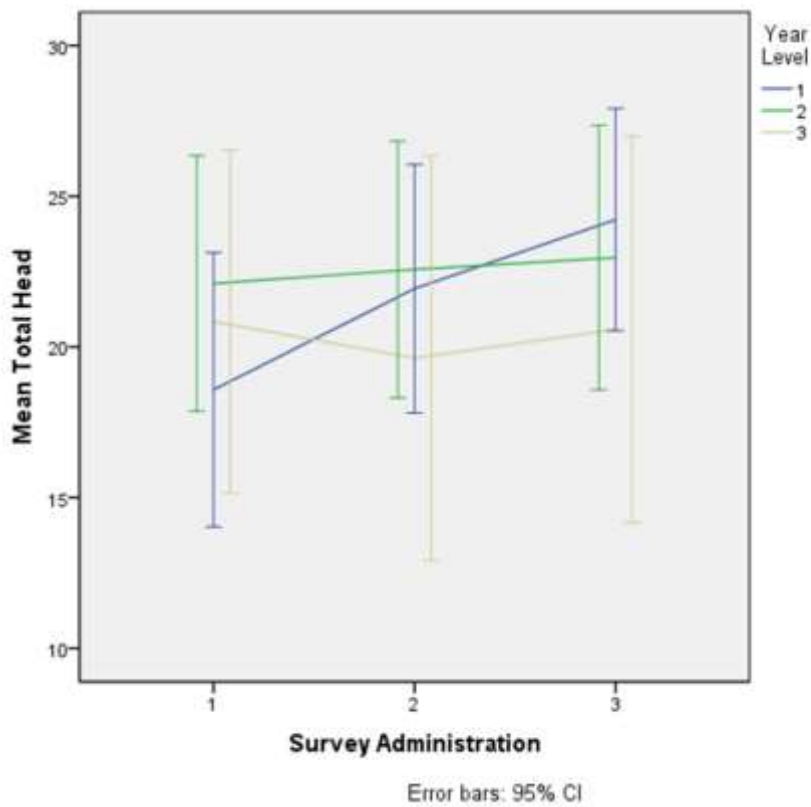
Item 7.26 - Textile design based on sustainable design principles can have an impact on climate change issues



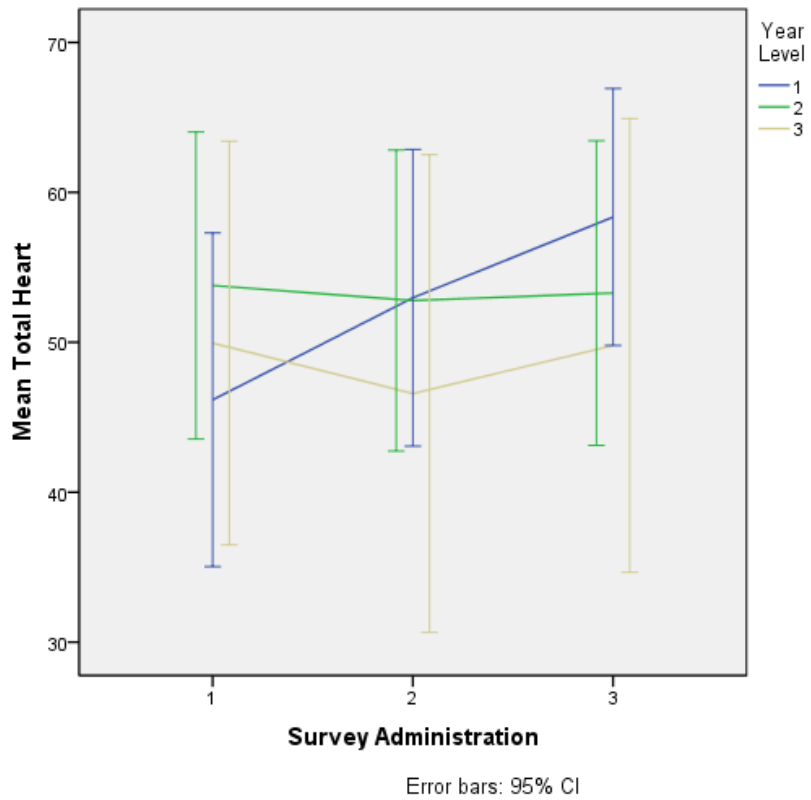
Item 7.27 - Learning about sustainability is relevant to my future as a textile designer



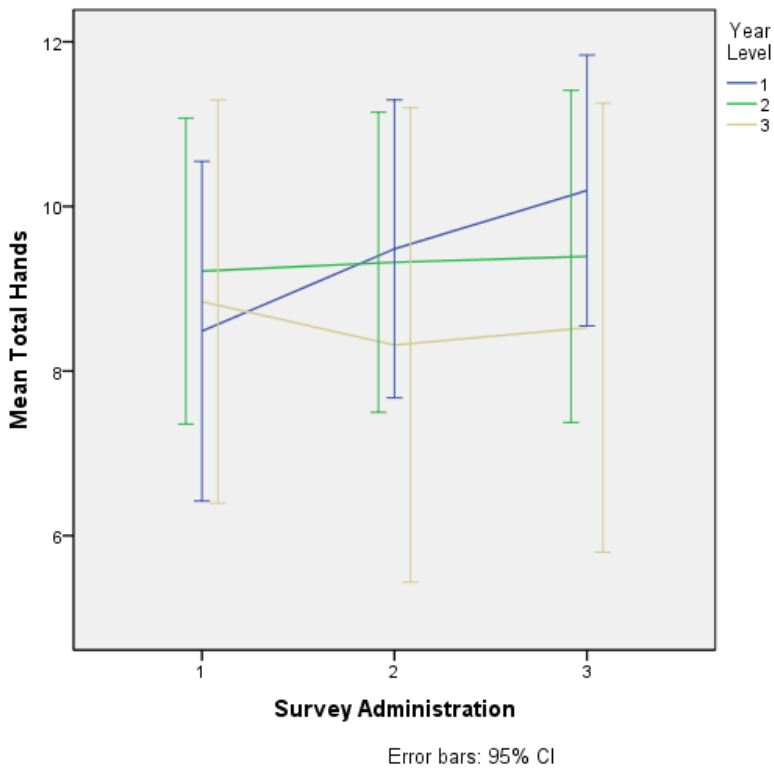
Overall mean of aggregated results for items 7.01-7.27 (with negative statements reversed)



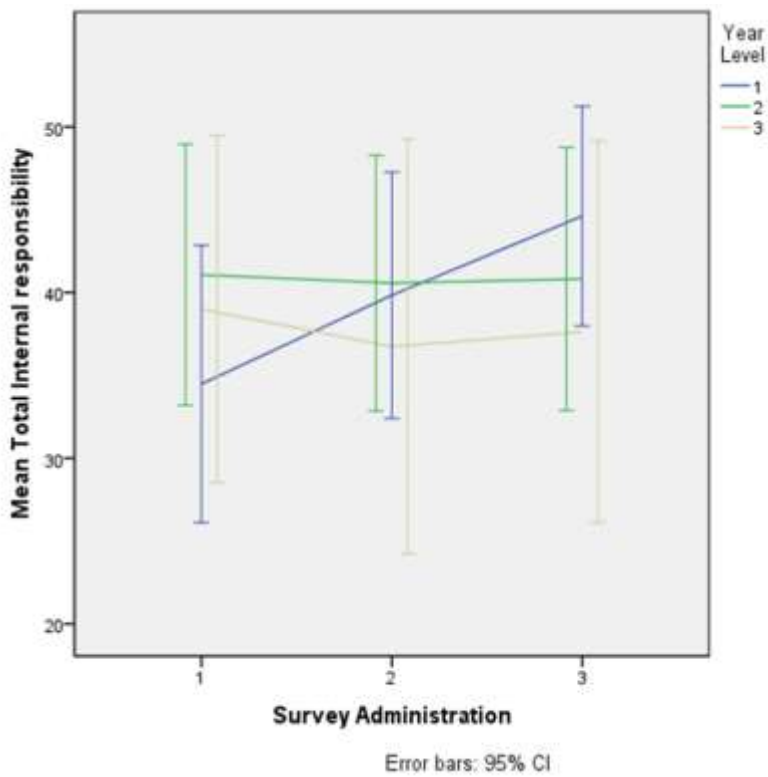
Mean of aggregated results for items relating to cognitive statements (I think ...)- Items 1, 3(rev),10 (rev),13, 18 (rev) ,23,26



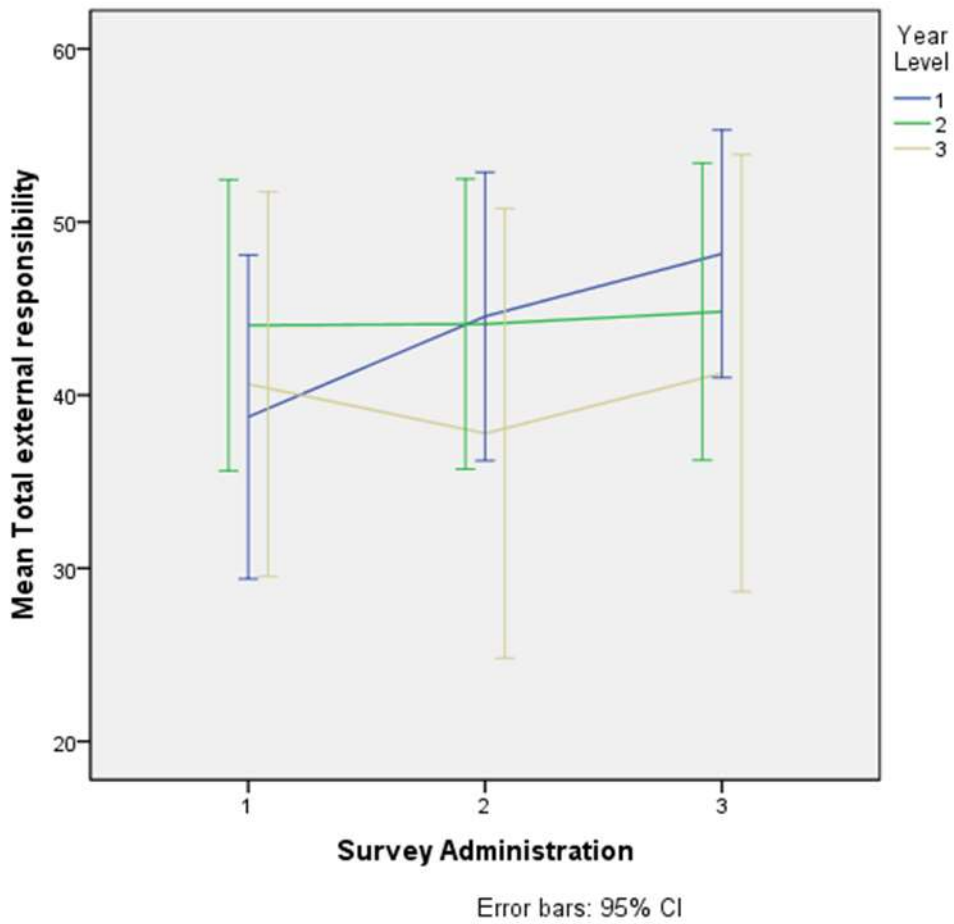
Mean of aggregated results for items relating to affective statements (I feel ...)- Items 4, 5 (rev), 7, 9, 11, 12, 14(rev), 15, 16, 17, 19, 20, 21, 22, 24, 25, \



Mean of aggregated results for items relating to skill statements (I can or I do...) - Items 2, 6(rev), 8



Mean of aggregated results for items relating to internal responsibility statements (It is my responsibility to ...) - Items 1, 2, 3(rev), 6(rev), 8, 13, 15, 16, 19, 20, 23, 24, 27



Mean of aggregated results for items relating to external responsibility statements (It is society's responsibility to ...) – Items 4, 5(rev), 7, 9, 10(rev), 11, 12, 14(rev), 17, 18 (rev), 21, 22, 25, 26

Appendix G – Teaching Observations – example of notes from post observation discussion with academic (semester 1)

Facilitator’s Notebook 1, pp. 165-166

Typed up version

[Class topic]Localism

This is a small group of half [the] cohort. [Teacher] provided handout to students and me of activities.

Students [were] asked to reflect on their [understanding] of concepts to do with Localism; share and discuss ... in groups. (3 groups)

[Teacher] discusses the students’ concepts of localism. She shares knowledge of fairtrade. She presents scenarios that are close to students’ lives. Eg. “you are looking to buy a new jumper, you might feel more comfortable knowing it is made ... etc”

Students present examples and are able to highlight complexities and paradoxes – eg. child labour to feed family. IE. the difficulty of applying Western standards on/to other cultures. Acknowledging there are not always going to be easy answers.

[Teacher] referenced the ABC2 program looking at [textile design and] fairtrade from young people’s perspectives ([and] realities for India).

[Teacher] asks students to share ideas in groups and one student from each group to report back on ideas relating to localism. [Teacher] scribes on board.

[Teacher] highlights that this is just touching on 3 pillars, but that students will look more deeply/closely at this in [semester] 2.

[Teacher] open to a range of inputs, including me.

Broad range of concepts covered to demonstrate ideas.

Linkd to presentation of ideas from [industry member].

Souvenir – [teacher’s] example as something that can be explored as being deconstructed.

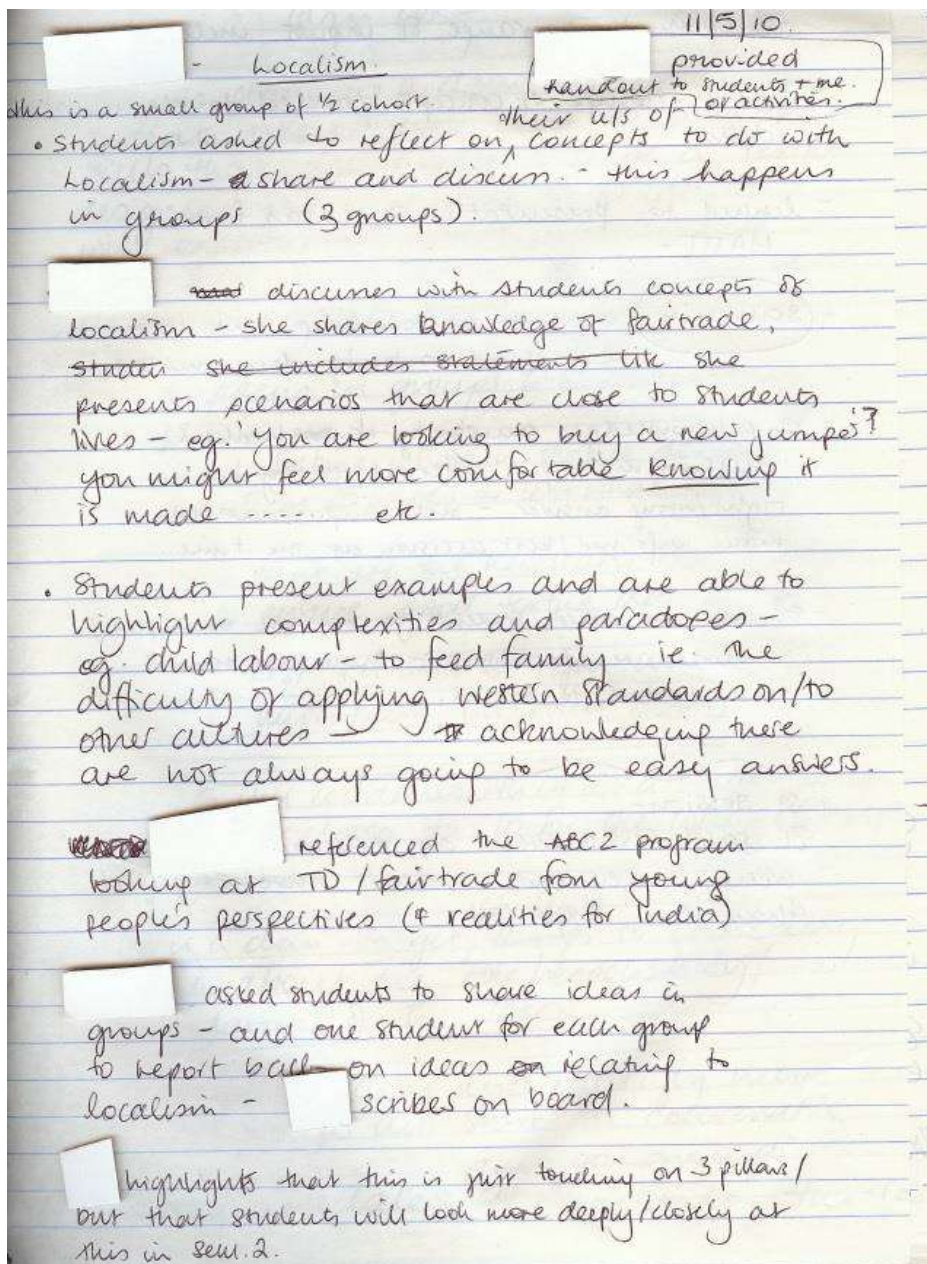
[Teacher] acknowledges complexity of localism. Decision making [is] affirmed as no right [or] wrong answer. Most important to make informed/best decision at the time.

[Teacher] has asked students to research examples/resources re: localism. These were shared and added to board.

Post session [discussion with teacher]

[Teacher] said session went as planned but went longer and students [were] more engaged than she expected.

Scan of original



- open to a range of inputs including me.
- broad range of concepts covered to demonstrate ideas
- linked to presentation of ideas from MATT -
- Souvenir - example as something that ~~has~~ can be explored as being deconstructed.
- acknowledges complexity of ~~localism~~ localism decision making - affirmed ~~that~~ no right/wrong answer - most important to make informed/best decision at the time.
- ~~had~~ had asked students to research examples / resources re localism. - these were shared and added to board.

Post session -

said session went as planned but went longer and students more engaged than she expected.

Appendix H – Sample of written course curriculum - pre and post curriculum change

Pre curriculum change – student brief for third year course.

Note: These were prepared by and remain the property of an academic member of the project group. They are reproduced with permission.



[A third year course]

Project Value: 50% of total mark for this course

Project due: Week 14, Thursday, 12 June 2008 @2pm.

Pattern Clash: fabric translation (weave)

AIM

Based on the folio of work developed in [course] project one, students are to generate a range of fabric swatches and a fabric length for either an interior or fashion outcome. The emphasis is on developing and demonstrating a creative design and technical competency skills in the students' major area (print/weave/knit).

OUTCOMES

1. Fabric swatches (65%)

Design a co-ordinated range of 6 fabric swatches, based on the design development work from project 1 Studio Textiles.

The 6 swatches include: 2 jacquard design swatches (minimum size 20x30cm) and 4 dobby hand loom swatch (minimum size 15x25cm). Note the finished swatch size can vary from this, as this may be necessary in relation to the outcome types you decide to design towards.

Student must show evidence of their speciality area (weave), but may also explore other textile techniques in relation to fabric manipulation, deconstruction and embellishment. Be selective and consider appropriate techniques to assist theme interpretation and overall range co-ordination. Note suggested colour palette should be 4-7 colours.

Note students should first weave an experimental length (warp 6cm) to assist in developing ideas for the finished fabric swatches.

Emphasis is on:

- *Design quality in relation to theme, colour, materials used and end use / customer*
- *Creativity and innovation - personalisation of the fabrics - combining techniques and use of embellishment.*
- *Range co-ordination*
- *Technical competency – includes preliminary support work*
- *Presentation and finishing of swatches*

2. Fabric Length (15%)

Based on the range of fabric samples produced, select one to develop into a fabric length (minimum size: if jacquard 40cmx100cm or dobby 15cmx50cm). Note this must be well finished.

Emphasis is on:

- *Design quality in relation to theme, colour, materials used and end use / customer*
- *Creativity and innovation*
- *Technical competency*
- *Finishing*

3. Concept board (PDF on CD) (20%)

This is to be a succinct summary of your project. Size is 40cm x 40cm (size appropriate for exhibition). This board is to summarise your project direction – colour palette reference, theme, fabrics and appropriate product simulation suitable to your intended niche market direction. These can be in the form of illustration / technical flats. You should also incorporate on the board the design work developed from Textile Studio pattern clash and must include a short written statement about your overall direction.

Note **submit as a PDF file on CD only.**

Emphasis is on:

- *Content – image selection, use of text and styling to communicate the overall fabric direction.*
- *Styling – consistent and appropriate styling in relation to theme and end use / customer*

ASSESSMENT

- 1. 65% Range of Fabric Swatches**
- 2. 15% 1 x Fabric Length**
- 3. 20% 1 x Concept board**

DUE Week 14: Thursday, 12 June 2008 in year 3 studio @2pm

LATE POLICY

The RMIT Late Policy applies to all projects - for more information refer to your copy of the BP121 Program Information booklet or to the policy loaded on Blackboard.

Consult with staff if there are any exceptional circumstances regarding the handing in of project work by the 'due by date'. A deduction of 5% per day will be made for late work handed in up to a period of 6 days beyond the 'due by date' (including weekends and holiday periods). Work that is handed in for assessment on day 7 or after, without an internal extension, special consideration or DLU in place, will be awarded a DNS/0% grade.

Design: overview

AIM

Create a textile design solution, based on your personalised research and creative practice explorations into an identified trend or issue. Emphasis is on creativity and innovation.

METHOD

This is a semester long project with three distinct phases: *research*, *explore* and *realise*.

- *Research* focuses on the theoretical; through linking research, critical thinking, and creativity. This phase will provide the framework for your design practice.
- *Explore* brings together the theoretical and practical; through a body of creative exploratory work based on your research.
- *Realise* focuses on the practical; through resolving and refining your research and creative explorations into a fully realised textile artefact or concept.

LEARNING OUTCOMES

You will consolidate and enhance existing knowledge and skill sets in the following areas:

- (i) Research and analytical skills applicable to design development and resolution.
- (ii) Inventiveness (creativity and innovation) to develop original design concepts.
- (iii) Practical design and technical skills with specific emphasis on your chosen textile speciality.
- (iv) Communication and presentation skills across a range of media.
- (v) Professional practice applicable to the textile designer, including ability to self-initiate, manage, reflect, and apply sustainability principles to design development and resolution.

OVERALL PROJECT REQUIREMENTS AND IMPORTANT ASSESSMENT DATES

Phase 1: Research (25%):

DUE: Week 3: Wednesday 14th March 5pm (digital submission)

- a) Research document (approx. 10 pages)

Phase 2: Explore (50%):

DUE: Week 10: Wednesday 9th May by 5pm

- b) A body of creative exploratory work based on your research, to include:
 - Resource folder consisting of: your design development, exploration & technical trialling
 - 20 swatches with: minimum of 14 hand generated swatches (specific to your area of specialisation) and maximum of 6 digitally generated swatches

Phase 3: Realise (25%):

DUE: Week 14: Wednesday 6th June by 3pm

- c) A resolved design artefact
 - This could be for example fabric length, a product (e.g. garment, accessory piece, cushion, etc.), or 3D textile piece or concept piece.
- d) A set of digital images (max.10) to document your design process and final design outcome.
- e) Project abstract (max. 150 words).

Refer to 'Design: requirements' handout for more detailed information on the three project phases.

ADDITIONAL RESOURCES

A folder is set up on the [course] Blackboard site with information relevant to the project.

LATE POLICY

The RMIT BA Textile Design Late Policy applies to all projects - for more information refer to your copy of the BP121 Program Information booklet or to the policy loaded on Blackboard. If you are experiencing any difficulty with the course you must inform your lecturer immediately.

PROJECT ASSESSMENT CRITERIA			LEARNING OUTCOMES / CAPABILITIES				
<ul style="list-style-type: none"> - The learning outcomes for this course reflect the skills and capabilities required to be a successful textile designer. - The assessment has been developed to ensure the learning outcomes are aligned to assessment tasks and assessment criteria. - This table summarises how the learning outcomes and assessment fit together. 			Research & analytical skills	Practical design & technical skills	Inventiveness	Communication & presentation	Professional practice
ASSESSMENT TASKS AND ASSESSMENT CRITERIA	Phase 1 (25%) Research Document	Design intent: is original and demonstrates a clear relationship between research topic (trend/issue) and design trajectory.					
		Quality of research material from a variety of credible sources					
		Written & visual content: demonstrates a level of initiative with research, critical analysis of research, clear understanding of ideas and an original approach.					
		Use of examples: relevant examples relating to trend/issue					
		Mechanics: text is well structured and organised, with a clear and consistent writing style					
		In-text citations and referencing using an appropriate referencing system					
		Style and format of document: reflects basic principles of design (i.e. layout, proportion, balance, hierarchy of images/information, colour management, font choice and readability)					
	Phase 2 (50%) Creative body of exploratory work	Work is relevant to the topic and research undertaken					
		Overall design quality: demonstrates a well finished range of swatches appropriate to final outcome					
		Creativity and innovation: personal approach to design concepts, demonstrating a creative and original exploration of ideas					
		Craftsmanship with textile design techniques and processes: demonstrates & applies a variety of advanced textile techniques and processes specific to specialisation.					
		Work demonstrates appropriate sustainability practice in approach, practice and outcome.					

Phase 3 (25%)		Level of exploration & design thinking maturity: experimentation & risk taking; ability to self-reflect and problem solve throughout the design process.	Orange	Green	Blue	White	Yellow
		Design process: demonstrates applied practical & technical design skills needed to develop the final design outcome	White	Green	Blue	White	Yellow
	Design artefact	Design relevance: success of design artefact in relation to stated trend/issue and product direction.	Orange	Green	White	White	Yellow
		Design quality: in relation to aesthetics, form and function, colour, materials used, techniques and end use/customer.	White	Green	Blue	White	Yellow
		Creativity and innovation: personalised approach to the development of the final outcome.	White	Green	Blue	White	White
		Resolution: presentation & finishing appropriate to outcome.	White	Green	White	Purple	White
		Design management: ability to self-manage and bring all aspects of the project together.	White	White	White	Purple	Yellow
	Digital images	Communication of the final design artefact.	White	White	White	Purple	Yellow
		Communication of the design process undertaken.	White	White	White	Purple	Yellow
	Abstract	Abstract is clearly defined and sets out the intended design direction of the project.	Orange	White	White	Purple	Yellow

Appendix I– Evaluation of student work – summary of evaluation results

Summary of evaluating student learning –review of student work ¹	Year Level	Main aspects of student work being reviewed	No. of reviews conducted review from total class by reviewer	Extent of sustainability criteria being met overall ²	% correlation between reviewers ³
Course A	3	Identify and visually express a sustainability idea, issue or message in a print design	Reviewer 1 - 13/18 Reviewer 2 - 13/18	High - 7 Medium - 4 Low - 2	92.3
Course B	2	No specific sustainability related learning outcomes for this course	Reviewed collaboratively 8/8	High - 1 Medium - 1 Low – 4 Nil - 3	Not applicable
Course C	2	Research design thinking and systems research thinking and apply to social dimension of sustainability	Reviewer 1 - 8/8 groups Reviewer 2 - 8/8 groups	High - 1 Medium - 4 Low - 3	87.5
Course D	2	Research, develop and apply sustainability approaches to design of product.	Reviewer 1 - 8/8 groups Reviewer 2 - 8/8 groups	High - 1 Medium - 2 Low - 5	87.5
Course E	1	Develop a design intent for a product - research, explain and discuss a sustainability concept or approach, including critique of researched material	Reviewer 1 – 10/29 Reviewer 2 - 15/29	High - 0 Medium - 4 Low – 11	77.8
Course F	1	Research and apply sustainable design approach to the development of a garment	Reviewer 1 - 27/29 Reviewer 2 – 9/27	High - 3 Medium - 9 Low -15	60

1 These represent one course per academic involved in the project, excepting one academic who was on leave at the time.

2 The review results presented here were all from reviewer 1, except in the case of course E, where reviewer 2's results are presented as more results were available in this case.

3 Due to the limited access to student work, not all student work available was reviewed by both reviewers. These correlations were calculated based on the reviews of student work reviewed by both reviewers.

Appendix J – Collaboratively written paper (Wahr & Underwood, 2010)

Wahr, F and Underwood, J 2010, 'Dealing with complexity in education for sustainability - a shared journey for students and teachers in design education', in Forsyth, Graham (ed.) Proceedings of Connected 2010 International Conference on Design Education, Sydney, Australia, 28 June - 1 July 2010, pp. 1-6.

Available from the RMIT University Research Repository

<https://researchbank.rmit.edu.au/view/rmit:13268>

Appendix K - Collaboratively written paper (Underwood et al., 2011)

Underwood, J., Wahr, F., Lynas, E., & Beale, C. (2011). A group approach to embedding sustainability within a degree curriculum: Collaborative, creative, iterative. In K. Hegarty, D. Chambers & A. Beringer (Eds.), *Proceedings of the 10th International Conference of Australasian Campuses Towards Sustainability, 2011* (pp. 63-68). Melbourne, Vic: RMIT, Australasian Campuses Towards Sustainability.

Available from the RMIT University Research Repository

<http://mams.rmit.edu.au/rr3do3huox6bz.pdf>

Appendix L – Reviewing teaching trials – sample of facilitator’s notes from discussion with academic

Facilitator’s Journal 2, pp. 51-53

Typed up version

Reflections on discussions with [Academic] following [class name]

[Facilitator suggested] use of grading criteria for [sustainability] could be more deconstructed. Use 2009 examples of good work to have discussion early in project. Expanding criteria, for example [Academic] could look for 1. Explanation of sustainability theme [or] 2. Explain how this theme is integrated into another aspect of [sustainability]. [For example] social, [economic],[environmental].

[Academic explained]. Some students get “it”, others still struggle. [Facilitator] asked how do we get them further? [Academic] stressed that the student’s process and moving from one place to another, i.e. difficulty in dealing with student’s maturity.

[Academic] explained students [do] not always avail themselves to get feedback during project.

[Facilitator] commented, the success of project relies on [Academic]s having [high] order [teaching] skills.

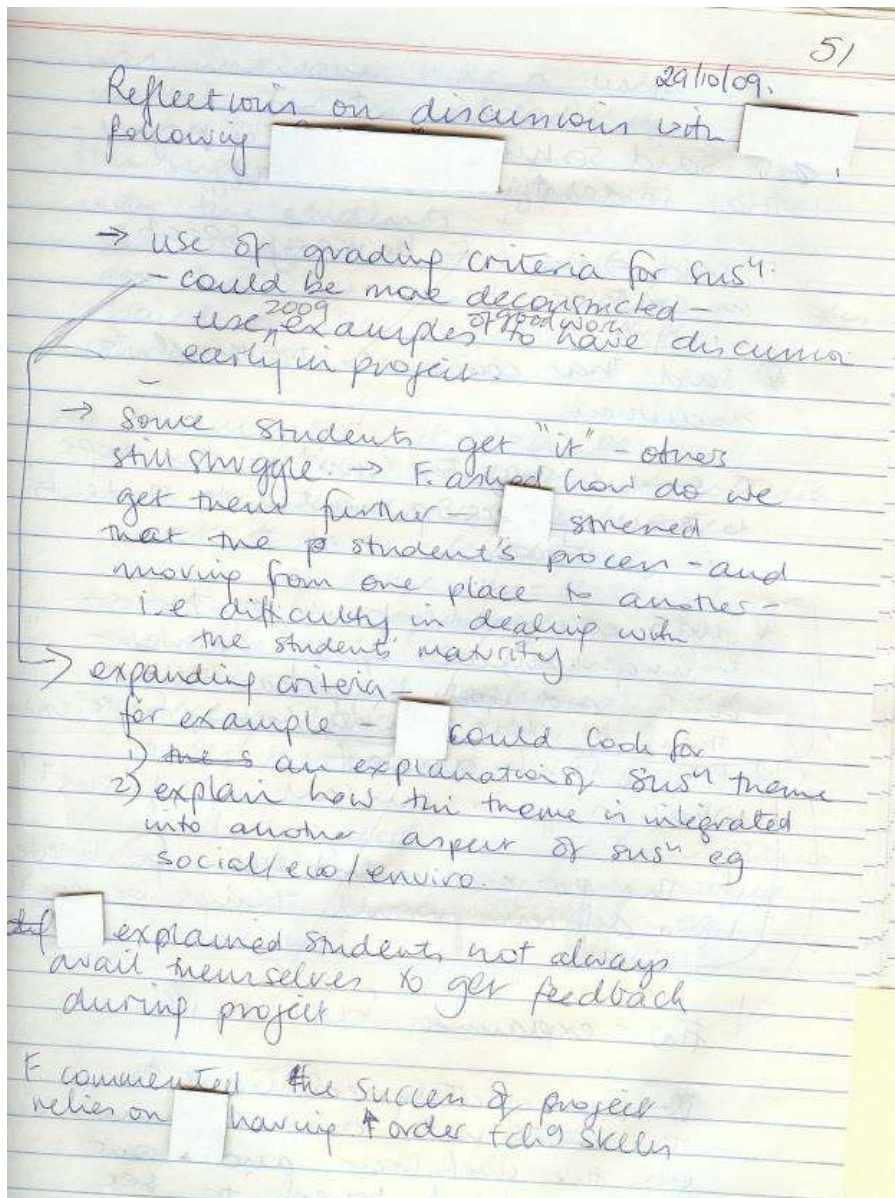
[Academic] said so much going on in project that students could look at.

Facilitator said, [therefore] need to be very specific in criteria. [Academic] said that can make too much to document.[Facilitator] suggested limiting the scope to some specifics presented to students in criteria. [Academic] was concerned about this as it might mean giving answers [to students]. [Facilitator] suggested telling them what [Academic is] looking for re: examples.[Facilitator] explained SOLO [taxonomy] to [Academic]. [Academic] immediately related it to the work and commented on the usefulness and how she had tried to see things this way and was unaware that a useful model for this already existed. She suggested she might use it with the students to help them see what she was looking for; that she could structure examples based on SOLO model to explain assessment criteria etc.[Facilitator] commented [SOLO] can be used to write ILO’s and assessment criteria; the standard for graduates; that each level had its place, eg. some uni-structural learning is appropriate; [and]

the role of verbs. I note I showed staff this concept earlier re: choosing ILO verbs, but for [Academic] it only resonated in this context.

[Academic] stressed the need to manage the learning load, re: [sustainability], that other courses would pick up other aspects of [sustainability], eg. Fairtrade in [another Academic's] project.

Scan of original



① said so much going on in project - that students could look at.

F said → need to be very specific in criteria

said that can make too much to document

F said to suggested limiting the scope to some specifics presented to students in criteria

was concerned about ~~go~~ this as it might mean giving answers -

but F said then suggested telling them ~~to~~ what you are looking for re: example

Reflective Qs for all staff

What is your current w/s of sus⁴?

if the project hadn't been facilitated how different would things be now?

FW - explained LCO to

immediately related it to the ~~work~~ work and commented on the usefulness and how it she had tried to see things this way and

was unaware that a useful model for this already existed -

She suggested she might use it with the students to help them see what she was looking for - ~~of~~ that she could structure examples based on SOLO model, to explain assessment criteria etc.

FW commented it can be used

- to write LOs, assessment criteria.
- the standard for Graduates
- that each level had its place eg. some uni-structural learning is appropriate.
- the role of verbs (I note I showed staff this concept earlier re ~~writing~~ choosing LO verbs - but for [redacted] it only resonated in this context)

stressed the need to manage the learning load, re: sus? - that other courses would pick up other aspects of sus? - eg. fair trade in [redacted] project.

Appendix M – Teaching Observations – example of notes from post observation discussion with academic (semester 2)

Facilitator's Notebook 2, pages 1-2, 4-5

Typed up version

27/10/2010

Pre-discussion [with teacher]

[Class] Goal –

- examining whether students have covered the three E's (equity, environment and economics) [in their assessment].

-2 x designs with an aspect of sustainability (see brief) in a conversational print.

- [students] presenting to class so [other] students can see outcome of each others work [as the] conclusion to an iterative/feedf forward learning experience.

-[the students' work is] in preparation for selection by Fair Trade/Moral Fairground for Fed[eration] Sq[ua]re presentation [in] Dec[ember] 2010.

Observations

[13 student presentations described]

All students are making links [between] an E related theme and their images. Each takes a few minutes only – students seem to be quite passionate about the need to communicate a message through their images.

Students seem motivated by [the] opportunity to present [their work] in a [design] competition – “which one will you print?” for the competition [asks the teacher].

Teachers told students how blown away, impressed the Moral Fair Trade people [were] with the quality [and] quantity of [the students'] work. This work is really challenging ideas of what [sustainability] concepts might mean in fashion. They will promote amongst designers.

Students [whose work is selected for the competition] have opportunity to be promoted. They keep their [intellectual property].

That the images/prints will be digitally printed [and] that no actual physical prints were done in mock-up, [is] actually more sustainable.

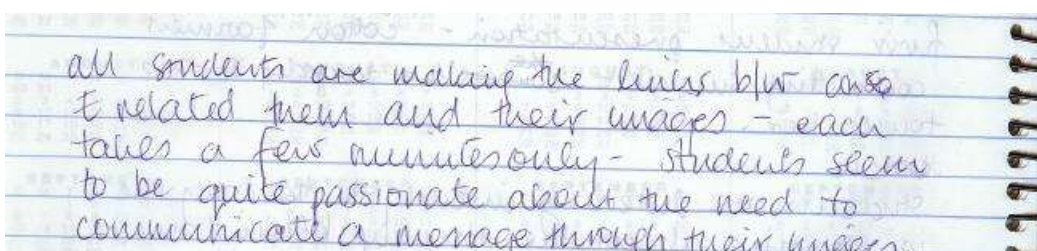
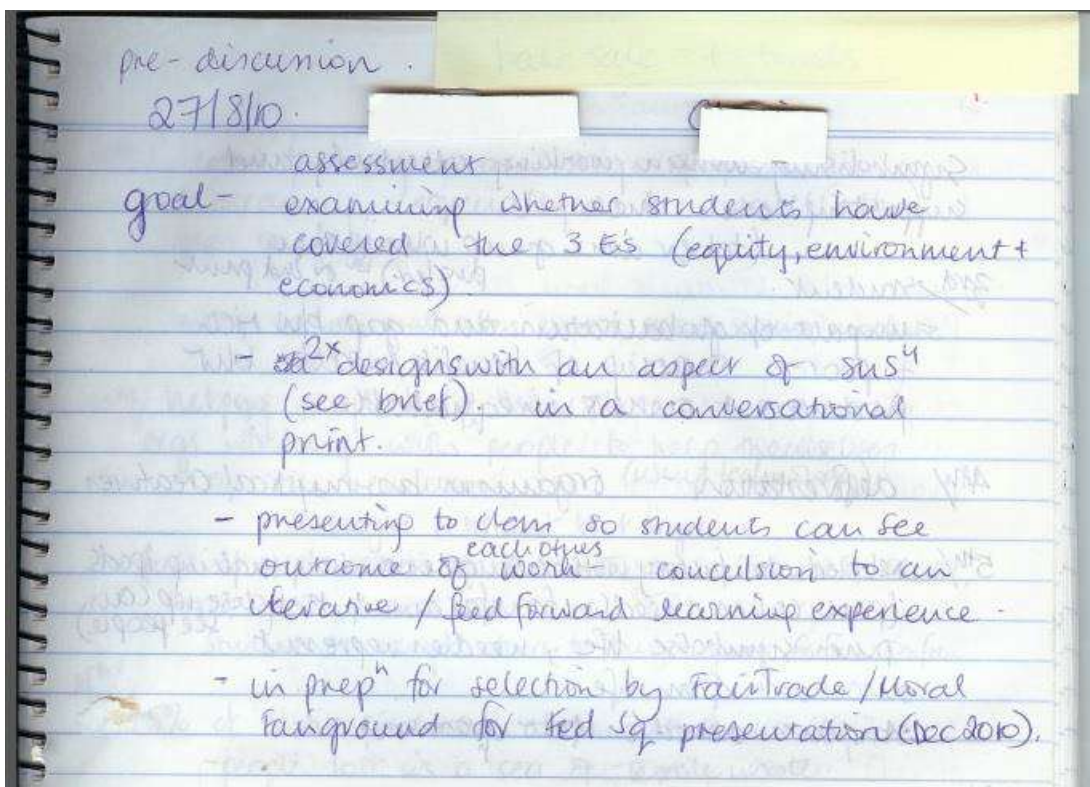
Post discussion with teacher

Expectation [of the class was] relaxed, informal, [and a] celebration of work, [to] show student outcome[s] [and] finish the project. Now about indepth analysis of pattern of 3 E's.

[A] sense of we've achieved something. Narrative of design the focus, rather than the 3 E's. Important for [textile designers that] professional skills are used in their context.

Good to hear students liked project. Students talking about the place of the work in their folios. Students indicated an [understanding] of what the purpose [and] value [the work was] to them

Scan of original



Students seem motivated by opportunity to present in a competition. "Which one will you print?" for the comp

Appendix N – Informal discussion with academics - example regarding assessment

Facilitator's Journal 2, pages 76-77

Typed up version

29/01/10 had a group discussion about assessment (informally) with [3 academics].

We discussed [AD's] draft grading criteria -> issues – generic enough? Language (is it meaningful to staff/students)

Fears of it being ad-hoc – half-baked makes [AE] want to trial with [AA] in CAD by developing a grading criteria which can be tried and evaluated – with the possibility of extending across courses.

Qu[estion] came up about year level st[andard]s, specific course standards. And comments about not knowing where to start with dealing properly with assessment.

This makes me think I need to provide more concrete assessment examples to illustrate.

Brought in assessing creativity paper – [AC] read very positively, saying there was much to share with students and to inform how creativity is assessed.

[AD] was concerned that it would be difficult to use a grading criteria by checking against its elements, rather than relying on her intuitive feel for the item. She is open to reading the assessment in creativity paper. I had been worried I'd made her self-conscious about assessment, and I asked if she was OK. She said she can find it overwhelming, but that's why she wants to do it in small chunks – see how it goes. I told her she was my champion with assessment and that she had taken a risk by putting her ideas out there and I wanted to thank her for that.

Scan of original

29/10/10 -
had a group discussion about amendment
(informally) with [redacted] a.

We discussed [redacted] draft grading
criteria - - issues - generic enough?
- language (is it meaningful
to staff/students)

-
fears of being ad-hoc - half baked makes
[redacted] want to trial with [redacted] in CAD
by developing a grading criteria which
can be tried and evaluated - with the
possibility of extending across courses.

Aw came up about year level stds,
specific course standards -
And comments about not knowing where
to start with dealing properly with amendment.

this makes me think I need to provide
more concrete amendment examples to
illustrate.

Brought in anering creativity paper - [redacted]
read very positively saying there was
much to share with students and

Appendix O – Collaboratively written paper (Wahr et al., 2013)

Wahr, F, Underwood, J, Adams, L and Prideaux, V 2013, 'Three academics' narratives in transforming curriculum for education for sustainable development', *Australian Journal of Environmental Education*, vol. 29, no. 1, pp. 97-116.

Available from the RMIT University Research Repository

<https://researchbank.rmit.edu.au/view/rmit:22607>