



Action research for Change Towards Sustainability

Change in Curricula and Graduate Skills Towards Sustainability

FINAL REPORT

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**A pilot research project, jointly funded by the
Australian Government
Department of the Environment and Heritage
and Macquarie University**

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Abbreviations

ACTS Action research for Change Towards Sustainability

NEEC National Environmental Education Council



Action research for Change Towards Sustainability

EXECUTIVE SUMMARY

Further and higher education plays a critical role in assisting change towards sustainability within our society. If graduates do not have the core understanding or vision for sustainability, the pathway towards a sustainable future will remain unclear. Achieving this will require innovation and organisational change – not just the integration of sustainability concepts within the curriculum.

'Action research for Change Towards Sustainability' (ACTS) is a two-year pilot project, jointly funded by the Australian Government Department of the Environment and Heritage and Macquarie University. It attempts to address the need outlined above, by exploring ways of changing curriculum and graduate skills towards sustainability. The project adopts an innovative approach, combining methodologies to explore sustainability across the disciplines in higher education. The main component of the project is on Action Research for change within universities. The project focus is on:

- exploring research based activities to innovate for sustainability, through curriculum, professional and/or organisational development;
- professional development of teachers of postgraduate units in sustainability education to support their plans for innovation; and
- cross faculty involvement.

A group of ten Action Researchers from Macquarie University, the University of New South Wales and Griffith University were involved in the project. The project attracted voluntary participation of staff from departments including: Accounting and Finance, Business, the Graduate School of the Environment, Health and Chiropractic, Linguistics, the National Centre for English Language Training, Psychology, Environmental Law and Landscape Architecture.

The project received a very high level of interest from other teaching staff and stakeholders external to the project who are seeking ways to engage this complex sector with issues of sustainability. The ACTS team have kept them informed of progress during the project.

The ACTS team compiled materials such as an ACTS CD Rom of key readings and examples of good practice as well as a participant's guide. These resources and workshop materials could be adapted and made available for use by others seeking to address sustainability and Education for Sustainability within the University curriculum.

There is strong evidence to suggest that the pilot project has contributed to the goal of encouraging and facilitating change within universities to enhance opportunities for the development of graduate knowledge and skills towards sustainability. Workshop feedback and participant (internal) evaluations conducted by the ACTS team document that many of the lecturers have developed their thinking and skills in sustainability, learning for sustainability and Action Research. Some have made significant changes to their teaching and curriculum so that it is more aligned with Education for Sustainability. A few are still working through their projects, as they chose to devote more time to planning and negotiating change with their colleagues or for timetabling reasons experienced a delayed start. The team is confident that more than half of those who participated in the project will continue to extend their work in this area after the ACTS project is completed at the end of September 2004. It is our observation that the Action Research process has proven to be appropriate and effective in attracting, as well as assisting, lecturers to make changes to teaching and curriculum at the postgraduate level.

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1 WHY WAS ACTS COMMISSIONED?

Further and higher education plays a critical role in assisting change towards sustainability within our society. If graduates do not have a core understanding or vision for sustainability, the pathway towards a sustainable future will remain unclear. However, there is increasing recognition that the higher education sector is one of the hardest sectors in which to institutionalise sustainability. Achieving such a change will require innovation and organisational change, not just the integration of sustainability concepts within the curriculum.

This recognition inspired the University-Industry Summit hosted by Macquarie University and the National Environmental Education Council in November 2001. Participants at the Summit identified the need of university graduates to have attributes such as critical, creative and futures thinking skills, confidence to deal with uncertainty, and awareness of sustainability. Further, the Summit highlighted that many educators are grappling with the issue of how to integrate knowledge and skills for sustainability into their discipline areas¹. In general, there is a lack of resources and support mechanisms for the shift towards sustainability in further and higher education².

A key recommendation of the Summit was that research be undertaken in the area of Education for Sustainability and that this process be accompanied by professional development for university staff³. *Action research for Change Towards Sustainability: Change in Graduate Skills and Curriculum for Sustainability*, referred to as ACTS, was the result. Its focus group are lecturers of postgraduate units, ensuring any changes affect professional courses and graduates who are more likely to be working in business, government and industry extending the affect of the project.

2 WHAT WAS ACTS ABOUT?

This **two-year pilot project**, jointly funded by the Australian Government Department of the Environment and Heritage and Macquarie University, has attempted to address the key recommendations from the Summit by exploring ways of changing curriculum and graduate skills towards sustainability. It has also tried to address deeper organisational issues to address sustainability, challenging world-views, how universities work and how lecturers can make changes towards sustainability.

The project adopts an **innovative** approach, combining methodologies to explore sustainability across disciplines in higher education: phenomenographic research and Action Research. These two methodologies are explained in more detail in Section 3.

The **goal** of the ACTS project was to advance the contribution of higher education to sustainability, with the main component being a facilitated Action Research with lecturers of postgraduate units.

¹ Tilbury, D. and Cooke, K. (2001) *Building Capacity for a Sustainable Future: Meeting the Needs of Industry through Environmental Education*, Sydney, Macquarie University.

² Tilbury and Cooke (2001); This was also raised during stream of the Sustainability Education conference held at UNSW, 18-20 February 2004.

³ See Footnote. 1



The core of the project was to a) explore sustainability as a **generic skill** across disciplines at the university level; b) explore **research** based activities to enhance **professional and organisational development** for sustainability; c) support teachers of **postgraduate** units in Education for Sustainability to support their plans for innovation; and d) assist **curriculum change** through Action Research, with the ultimate aim of preparing postgraduate students for addressing sustainability within their professional work.

Through involvement in the ACTS project, participating lecturers of postgraduate units had the opportunity to:

- explore how Education for Sustainability is relevant to their area of teaching and research;
- explore the value and limitations of Action Research;
- receive training support in Action Research and Education for Sustainability;
- engage in dialogue across disciplines;
- apply for funding grants through the International Office to explore similar projects overseas;
- collaborate with other higher education institutions in Australia;
- develop partnerships with industry;
- create new knowledge about sustainability within a university context; and
- publish their own Action Research outcomes.

These points were clearly articulated throughout the course of the project and in a learning contract which was signed by participants.

3 WHAT WERE THE KEY FEATURES OF ACTS?

The key features of ACTS are as follows:

- **Stakeholder Mapping and Communication** to raise awareness and gain support for the project within the university, request advice, and explore opportunities from others involved in this line of work in collaboration in Australia and overseas. Sharing the learning is seen to be an important outcome of the project. For this reason, stakeholders were invited to participate at different stages of the project to contribute and also learn from the experience.
- **Phenomenographic Research** was used to explore sustainability and creativity across disciplines. It was used to understand how lecturers understand sustainability, creativity and teaching these ideas in different contexts. The process involved a series of 'semi-structured' interviews with targeted invitations to academics at level A and B. It explored the questions:
 1. How is sustainability understood and integrated into teaching?
 2. What is the link between creativity and sustainability?
 3. How do lecturers understand the role of teaching for student's professional formation?

(Also see 'phenomenographic research' in glossary Appendix J)

- **Professional Development for participating lecturers.** This was undertaken through workshops, which provided both knowledge and skills in Action Research and Education for Sustainability.
- **Action Research:** The project recognised the need to build capacity in Action Research – not action and research, but Action Research as a particular methodology for research.
- Action Research can be used as a collaborative research tool, which is often represented as a four-phase cyclical process of critical enquiry of praxis for participant lecturers - plan formulation, action, outcome observation and reflection. The process engages lecturers in critical research into contextual epistemology, pedagogy and ontology - transforming thinking and action towards sustainability. The project provided training in techniques of data collection and analysis used by Action Researchers during the workshops.

(Also see 'Action Research' in glossary Appendix J)

- There was also a need to build capacity for **Sustainability and Education for Sustainability** in higher education. Education for Sustainability involves students and educators in a process of active learning and futures thinking, and addresses the generic skill needs of business and industry. The skills and areas of learning that universities should be actively involved in providing participants as identified by the Summit, which also conform with Education for Sustainability, include:

- critical, creative and futures thinking skills to develop alternative and innovative solutions to sustainability issues;
- needs assessment and action-oriented skills needed to motivate, manage and measure change towards sustainability;
- interpersonal and intercultural skills needed to redefine relationships amongst the various stakeholders – abilities to open communication between workforce and executives, government, community, and legislators;
- confidence and skills to deal with uncertainty;
- learning through engaging with real and specific problems or tasks; and
- learning about and for sustainability.

(Also see 'sustainability' and 'Education for Sustainability' in glossary Appendix J)

Key areas covered during the workshop program were as follows:

- * Sustainability thinking and practice
- * Education for Sustainability and its relevance to staff's specialist areas
- * Sustainability in higher education
- * Case studies of action research and higher education
- * The 'how to' of action research - methodologies, tools and case studies, data collection and analysis, and ethics
- * Planning individual research projects

Feedback given by participants at the end of Day 3 of the workshops (15 November 2004):

"More good activities and things to think about, ponder, take home and consider how I can use them in my practice."

"The third day has continued to expand and challenge my mental models of research and sustainability. Thank you for 3 stimulating days – all day! Now - the reading."

"Today was very useful in terms of planning and thinking about research projects and ethics. Now is the challenge to map out the sustainability project. Will we cooperate and do PAR – I hope so. Thanks."

- Activities engaging the participants with key **Declarations** (e.g. Talloires, Ubuntu), **Partnerships** (e.g. Global Higher Education Sustainability Partnership, International Association of Universities), **Conventions** and **Best Practice** in higher education formed an important part of the workshops.
- The workshops employed **participatory learning** activities, offered the opportunity to discuss case studies presenting good practice, and piloted new action learning activities to engage with Action Research, sustainability and Action Research for change in curricula.
- **Resources** were developed for the workshops including a participant handbook and CD Rom containing the relevant readings for these areas and further examples of good practice. This feature was integrally linked to the Action Research component.
- Once trained in the methodology, **Action Research** was used by participating lecturers from across disciplines **as a tool for exploring what and how to address sustainability into practice within their curriculum**. The ACTS Team worked with the Action Researchers to identify a research program to address those needs and facilitate the process of curriculum development and develop skills as lecturers in Education for Sustainability.
- In addition, the ACTS Team provided support during the planning and implementation of their projects through:
 - **One on one advisory sessions** which were held with each participant providing opportunities for them to reflect on their understanding of the project focus, how it related to their context, and what they were considering doing as part of their Action Research project. These sessions also aimed to increase their confidence in an unfamiliar area.
 - **Mentoring sessions.** Informal group meetings, coordinated by the participants were envisaged to take place following the workshop program. However, following the one-on-one advisory sessions and the formative evaluation it became apparent the participants required more structured support on a regular basis. The ACTS team decided to add a mentoring component to the original design.
 - Mentoring consisted of individual meetings and group sessions, facilitated by a member of the ACTs Team. Mentoring provides an opportunity for participants to share their plans, reflections and explore ways of bringing about change towards sustainability within curricula. The agenda for each meeting was formulated from participants' suggestions. The sessions generally consist of informal discussions regarding Education for Sustainability, guidance for the analysis and interpretation of results, how to judge that an action has been successful or effectively contributed to the goals of the project. Participants found these sessions important for providing structure for their research and served as a reminder (in their busy schedules) of their commitments to the project.



(Also see 'mentoring' in glossary Appendix J)

- **Critical Friends Reflection** meetings were held by the ACTS Team and facilitated by Professor Anne Burns who acted as a critical friend.
- A critical friend is a person who can assist the process of reflection and articulating experiences by asking critical and sometimes provocative questions. They are able to stand back from the process and also listen to assist in sorting through thinking. The Critical Friends Group was an important component as it provided time for the team to reflect on the ACTS process allowing time to identify key lessons for the process as it was unfolding and to consider issues relating to the transferability of ACTS to other institutions.

Comments made during critical reflection meetings:

“Importance of group sessions, time and space to reflect for a purpose and discover”

“Wanted to continue to collaborate to support one another”

“Tension between product and process...in research”

“It is a misnomer that early career academics when ever I run flocks of our own staff group articulated a real need for early career.” “not just early career discovering new ways of research and need support”

“Where is your target group...”

“This project has helped me realise what my colleagues know and don't know about sustainability”

- Key issues discussed by the team during these meetings include:
 - importance of cross faculty involvement;
 - roles and skills required for the project team;
 - support systems essential for participating Action Researchers (eg advisory meetings, group mentoring sessions, resources, forums for reflection and forums for learning);
 - scope of the professional development workshops, particularly given the range of capabilities of participants;
 - broader application of Action Research in the university;
 - time commitment of Action Researchers;
 - how structured the project is at the outset;
 - group dynamics in reflective meetings (eg peer groups, formal vs. informal conversations);
 - participant mix – who is the target group;
 - suitability with the process depending on the participant and in some instances the disciplinary background and what affect this may have on transferability, professional development and supports needs throughout the project; and
 - role of facilitator in the mentoring meetings to ensure sustainability of the process and reduce dependence.

(Also see ‘critical friends’ in glossary Appendix J)

- **Evaluation** of ACTS has been both an **internal formative evaluation** and an **independent summative evaluation**. The formative evaluation has involved the team reflecting on ACTS while it was in progress, providing opportunities for the project to be improved. The summative evaluation was conducted by Dan Garlick, as an independent evaluation with a focus on the potential for the ACTS process to shift universities towards sustainability and be transferred to other institutions⁴.

⁴ Dan Garlick, the ACTS Evaluator, will submit a separate Evaluation Report, which considers the value and limitations of this process and transferability to other institutions teaching at the postgraduate level.

4 WHO PLAYED A ROLE?

4.1 Action Researchers

The group of ten Action Researchers included academics from Macquarie University, the University of New South Wales and Griffith University. The project attracted voluntary participation of academic staff from various departments at Macquarie University including: Accounting and Finance, the Graduate School of the Environment, Health and Chiropractic, Linguistics, the National Centre for English Language Training, Psychology and Environmental Law⁵. One participant from Macquarie shifted to Griffith University during the life of the project and continued to work on curriculum change for sustainability and business ethics. The project was joined by two senior members of staff from the Department of Landscape Architecture, University of New South Wales.

The following provides a comprehensive list of the final group of participant Action Researchers.

James Hazelton, Macquarie University

Division: Economics and Financial Studies

Department: Accounting and Finance

Position: Lecturer

Course: Advanced Corporate Accounting

Research Focus: Introduction of concepts of social responsibility into the Accounting and Finance curriculum and a new course in Business Ethics. James has been working with another colleague to integrate the concepts of sustainability into the new course.

Email: jhazelto@efs.mq.edu.au

Robyn Beirman, Macquarie University

Division: Environmental and Life Sciences

Department: Health and Chiropractic

Position: Lecturer

Course: Chiropractic - Diagnostic Specialties

Research Focus: Linking with the profession – involvement of employers in defining graduates skills for contributing to sustainability.

Email: rbeirman@els.mq.edu.au

Jennifer Godfrey, Macquarie University

Division: Linguistics and Psychology

Department: NCELTR

Position: Lecturer

Courses: Teacher of ESL/EFL (English language) teachers

Research Focus: Incorporation of the concept of sustainability in second language teaching.

Email: jgodfrey@nceltr.mq.edu.au

⁵ The number of participants at the close of the project was nine with one of the participants withdrawing from the project.

Judi Homewood, Macquarie University

Division: Linguistics and Psychology

Position: Lecturer

Courses: Neuroanatomy for neuropsychologists

Research Focus: Exploring corporate sustainability and ethics through student projects interviewing future employers. Judi is working closely with Matthew Haigh.

Email: homewood@psy.mq.edu.au

Mira Kim, Macquarie University

Division: Linguistics and Psychology

Department: Linguistics

Position: Associate Lecturer

Research Focus: Developing knowledge and skills in Education for Sustainability through teaching of translation.

Course: Theory and Practice in Translation and Interpreting

Email: mkim@ling.mq.edu.au

Ros Taplin, Macquarie University

Division: Environment and Life Sciences

Department: Graduate School of Environment

Position: Lecturer

Course: Environmental Management and Environmental Planning

Research Focus: Sustainability in decision-making processes in Australia, in particular Environmental Impact Assessment and how to develop Education for Sustainability skills within environmental graduates.

Email: rtaplin@gse.mq.edu.au

Linda Corkery, UNSW

Division: Faculty of the Built Environment

Position: Head of School, Landscape Architecture

Course: Landscape Architecture, Design Studios, Environment Planning, Environmental Sociology, Professional Practice subjects.

Research Focus: Develop an integrative framework for teaching and learning ecological design in a new Master of Landscape Architecture (MLA) by coursework, working across disciplines and institutions.

Email: l.corkery@unsw.edu.au

Catherine Evans, UNSW

Division: Faculty of the Built Environment

Position: Lecturer

Course: Landscape Architecture, Design Studios, Ecology/Environment, History/Theory

Research Focus: Develop an integrative framework for teaching and learning ecological design in a new Master of Landscape Architecture (MLA) by coursework, working across disciplines and institutions.

Email: catherineE@fbe.unsw.edu.au



Matthew Haigh, Griffith University

Division: Economics and Financial Studies

Department: Accounting and Finance

Position: Lecturer

Course: Advanced Corporate Accounting

Research Focus: Introduction of concepts of social responsibility into the Accounting and Finance curriculum. Matthew has organised specific sessions where students have the opportunity to question potential employers regards sustainability and reflect on whether they are consistent with their marketing messages.

Email: M.Haigh@griffith.edu.au

4.2 Industry Advisory Group

An outcome of the University-Industry Summit was the formation of the Industry Advisory Group for Sustainability Education to inform future University-Industry initiatives. The formation of this group recognised that industry plays an important role in defining curriculum and reconnecting universities with society. Participants were encouraged to liaise with the Industry Advisory Group and relevant stakeholders - institutions, industry, government and community – in conducting their Action Research projects.

Project updates were provided to the Industry Advisory Group during the project to keep them informed of progress, but more importantly to provide an opportunity for industry players to contribute to the outcomes of the ACTS process.

Table 4-1 provides the list of members and their organisations.

Table 4-1 Industry Advisory Group Members and Organisations

Maree McGaskill	Beverage Industry Environment Council
Peter Castellus	Global Knowledge Ventures
Julian Crawford	ECO Steps
Richard Boele	Australian Institute for Corporate Citizenship
Suzanne Little	Filson Consulting
Paul Bateson	Local Government
Lisa France	Parsons Brinckerhoff
Mark Mackenzie	Abbott Consulting Group, Senior Consultant
Mark Glazenbrook	BP Australia
Anita Mitchell	Waste Services, NSW Government

4.3 Critical Friends Group

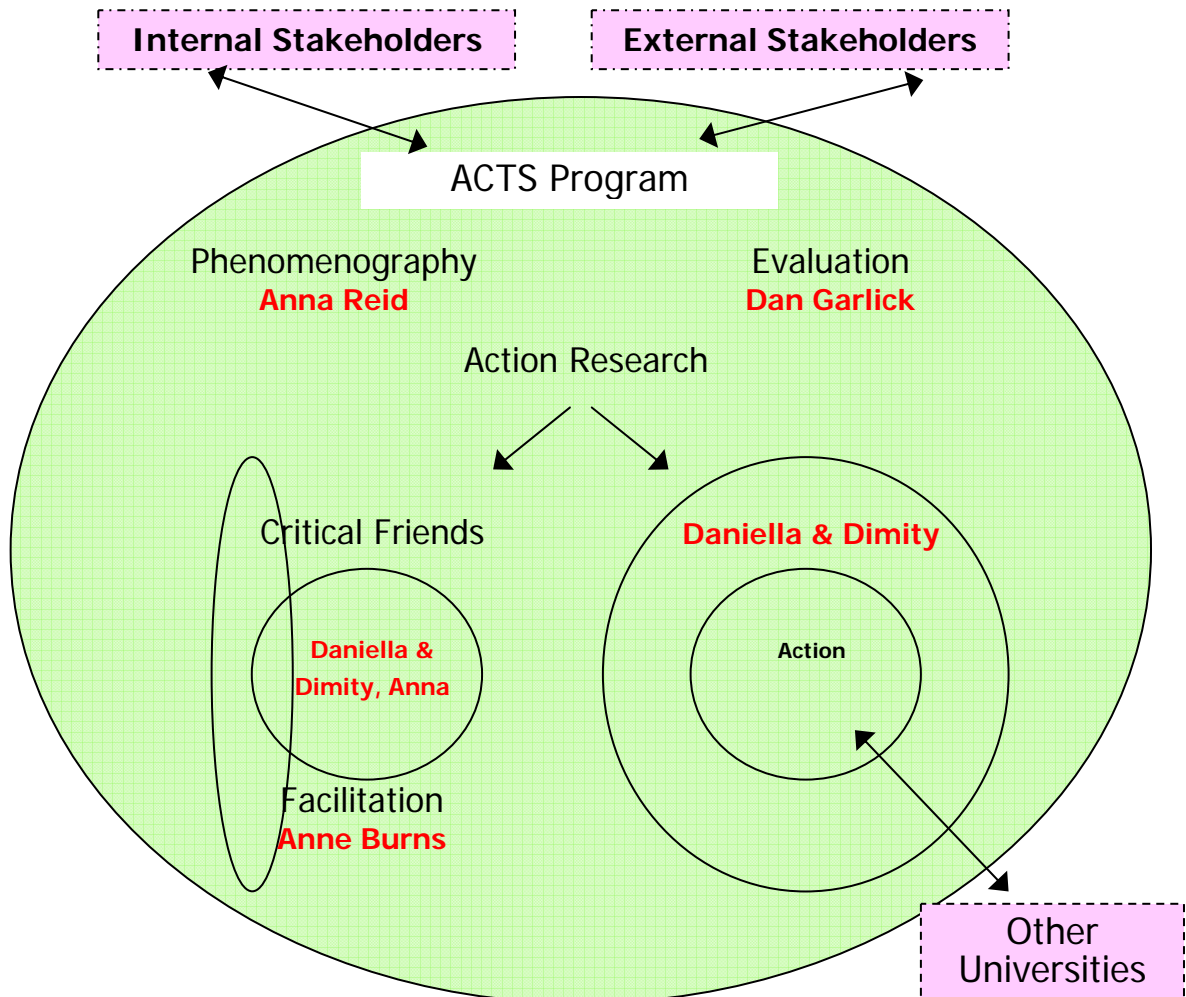
The Critical Friends group involved Professor Anne Burns as the facilitator, and Daniella Tilbury, Dimity Podger, Anna Reid, Dan Garlick and Kate Henderson as participants. The group greatly assisted Daniella Tilbury and Dimity Podger, co-facilitators of the Action Research component, to reflect on the facilitation and design of the project, and formulate lessons learnt which form a component of this report for sharing with other institutions who may wish to implement ACTS.

Also, refer to the front page of this report, which outlines the different project leadership, management and research roles played by the core team.

5 HOW WAS ACTS MANAGED?

The ACTS project involved four core elements: Stakeholder Involvement, Phenomenography, Action Research and Evaluation. The Action Research process took place at two levels. At one level, Daniella and Dimity facilitated an Action Research process for the participating lecturers who were critical reflective practitioners (CRP) or participatory Action Researchers (PAR) (see 'CRP' and 'PAR' in glossary Appendix J). At another level, both Daniella and Dimity were undertaking their own Action Research project focused on the process of facilitating change institutionally and the value of Action Research as a methodology to achieve this. These elements are presented in Figure 5-1.

Figure 5-1 Key Elements of ACTS



6 WHAT WAS THE PROJECT APPROACH?

6.1 Key Features

A number of **key features** characterised the project approach:

- **Ongoing Communication:** Communication took place throughout the project in order to provide opportunities for stakeholders with an interest in the project to learn from the experience and contribute to the process.
- **Focus on Research:** In order to attract university researchers, a strong focus was placed on research in the advertising material for the project. It was recognised that undertaking and publishing research is an important aspect of the professional responsibilities of university lecturers and high up on their list of priorities. This need was designed into the approach, with a formal requirement of involvement in the project being to publish their research. This meant that the project was also seen as (i) important by teaching and learning committees which endorse a research approach to curriculum development; (ii) by university research committees who are seeking to increase their research quantum and (iii) by senior management who value research income and outcomes over other university priorities.
- **Establishing Relationships:** Prior to the professional development program (workshops), the ACTS Team fostered and arranged opportunities to meet potential participants. It organised a briefing meeting and coffee chats to address questions from potential participants.
- **Maintained Flexibility:** The ACTS Team maintained flexibility in the research design and workshops to ensure it accommodated the needs of participants. This was also reflected in the introduction of the group meetings.

6.2 Key Principles

Action Research is **conceptually congruent** with Education for Sustainability (see 'conceptual congruence' in glossary J). This compatibility arises because the processes are underpinned by the same paradigm which attempts to marry the **what** (project focus) with the **how** (project approach).

Both processes assume that for change to occur capacity building of the individual is needed. However, they also require the focus of the project to go beyond individual professional development and support institutional change which embeds an action in the system.

A number of **key principles** (informed by this conceptual congruence) underpinned the project approach and are as follows:

- **No expert relationships** – All involved are learners in the process. All participants and stakeholders have something to contribute but also something to learn from the experience. There were no expert relationships. The project's core team acted as facilitators and critical friends.
- **Learner centeredness** - In other words, the project was driven by the lecturers needs rather than by the ACTS Team agenda.
- **Democratic process and respect for all persons** – This was important, particularly given the various roles, different disciplines, perspectives, level of capability in teaching and research. This principle is particularly important when you are inviting academics of different

levels (staff from the assistant lecturers to professor level were involved in the ACTS project) and specialisms (pure science to linguistics to business to architecture) to work together.

- **Partnerships and dialogue** – Partnerships and engagement of stakeholders in dialogue is considered vital to the success of the project. Many lines of communication were opened with various stakeholders in order to raise awareness and gain support for the project within the university, request advice, and explore opportunities from others involved in this line of work in collaboration in Australia and overseas. Sharing the learning is seen to be an important outcome of the project. For this reason, stakeholders were invited to participate at different stages of the project to contribute and to learn the experience.
- **Systemic Thinking** – Both processes recognise the need to challenge existing systems through promoting skills for systemic thinking. They promote capacity building and tools (such as those promoted by Stephen Sterling's 'linking thinking' (WWF 2004)) for assisting learners and change agents to institutionalise change.
- **Participation** – Genuine participation is critical to both Action Research and Education for Sustainability. The workshop program for Action Researchers used active learning and group participation tasks, the agenda for the group meetings was developed from the needs of the Action Researchers and opportunities were provided for the Action Researchers to engage with external stakeholders.
- **Autonomy and empowerment of participants** – The workshops were designed for exploration and mentoring sessions involving dialogue, sharing and the facilitator asking critical questions. Both recognise the important of participants keeping control of the process.



7 WHAT WERE THE PROJECT STAGES AND TIMELINES?

The following were the key stages and timeline for the project.

Semester 2 2002:

- Development
- Stakeholder mapping and communication
- Phenomenographic research

Semester 1 2003:

- Briefing Meetings
- Solicit Support - Management and Admin.
- Begin to identify potential focus for Action Research studies



Semester 2 2003:

- Workshops
- Planning Action Research Studies
- Keeping Portfolio
- Critical Reflection Meetings

Semester 1 2004:

- Undertake Action Research studies
- Mentoring Group Meetings to reflect on progress and share plans
- Keeping a Portfolio to reflect

Semester 2 2004

- Submit portfolios (or summaries)
- Write-up process and submission of paper
- Some continue with Action Research
- Some will undertake international visits
- Project Report to Sponsors
- Critical Reflection Meetings

8 WHAT WERE THE CHALLENGES?

- 8.1 Lecturers required more support than was anticipated:** University lecturers needed more support to undertake their Action Research projects following the workshop program than was expected. A more formal mentoring program was added with monthly group meetings organised and facilitated by the ACTS Team.
- 8.2 University staff found it difficult to relate to the idea of sustainability:** This took a great deal of time and project focus in the initial stages, particularly as the project chose to target those working in disciplines which are not traditionally associated with sustainability. Following the workshop program, the ACTS Team made it a point of meeting with the individual Action Researchers to assist them to establish the link between sustainability and their specialism. This was necessary as there is a limited amount of documentation about the relevance and implications of sustainability to some of their specific disciplines.
- 8.3 Difficulty in encouraging lecturers to engage with industry:** Although the project focus was to raise graduate skills to assist business, industry and government to meet the challenges of sustainability, only two lecturers engaged industry in scoping what sustainability means in their discipline or identifying the specific graduate skills they thought necessary. Meeting with members of the Industry Advisory Group or key sustainability champions in their field may have helped here.

- 8.4 It proved harder to involve the industry advisors of the Industry Advisory Group in the project than anticipated:** The involvement of the Industry Advisory Group was limited and mostly took place via email. This medium made it difficult for members of the Group to get a sense of the enthusiasm, commitment, focus or needs of the Action Researchers. Further, there was also no relationship between the members of the Industry Advisory Group. Face-to-face interaction was needed for the Group and with the Action Researchers. This could have developed if they had met at least once during the course of the project. Project funding was not available for these purposes.
- 8.5 Scheduling the lecturers to meet as a group for the workshops was perhaps the biggest unexpected challenge.** It was also a challenge to organise the group meetings resulting in two meetings being scheduled. This had significant implications for timelines – the Action Research projects could not commence without all the lecturers having participated in the workshop program, which necessarily required a block period of time. It also increased the workload of the project manager in coordinating schedules and trying to maintain the enthusiasm of the lecturers through the delayed start. Organising meetings of academic staff during semester breaks is perhaps the most opportune time.

9 WHAT LESSONS WERE LEARNT FROM THE EXPERIENCE REGARDING CHANGE IN HIGHER EDUCATION?

Dan Garlick the evaluator will in his evaluation report to the Australian Government Department of the Environment and Heritage provide an outline and analysis of the lessons learnt from the experience.

10 WHAT DID WE LEARN AS A TEAM?

The ACTS Team throughout the two years of the project reflected on the project highlighting elements that would be important for others to know if the project was facilitated in a different context.

- **Changing the Workshop Program** - The workshop program in Action Research and Education for Sustainability must be conducted in a full day program format over a four-day period at least, depending upon the grasp of participants of the concepts. Further, the program should be timed to fall in the mid-semester break.
- Participants were given opportunities for **project planning** during each day of the workshop program. It would have been useful to have one full day at the end of the program dedicated to research planning.
- **Commitment of Action Researchers** - We consider it critical that potential Action Researchers commit to be involved in the entire workshop program.
- **Face-to-face meetings during the course of the project** - The face-to-face components



of the project have been essential with participants viewing the group meetings as points of focus and progress. The meetings provide opportunities to share achievements and frustrations and seek advice on where to go next with their project. Participants commented that although resources were provided, they also needed a reflective space.

- **Journals and Reflective Spaces.** Reflection on learning is essential for the Action Research process and involves documenting your journey. Without ongoing reflection people may not be aware of the shift they are making in their viewpoint and experience as a result of engaging with Action Research. Journals or portfolios were encouraged for use by participants to record their reflections however some did not use them. It may be important to negotiate a medium for each participant to engage in reflection.
- **Support structures are crucial to ensure participant continuation and changes are made.** The one-on-one reflective meetings and facilitated group sessions involving the participants are essential.
- Participants want to be able to bounce their ideas off other people and understand through a collaborative learning process with peers. On an individual level, participants find researching daunting and therefore ensuring there is support is crucial for their continuation and making changes. Also, as their understanding of Action Research and sustainability shift they need to engage in discussion with that new understanding.
- **Critical friends reflection meetings** were vital for ACTS Team and the evaluation. They are important because they force the team to come together and think and reflect about the process. The individual reflections are pushed to a different level as a group.
- **It is critical that the evaluator understands the conceptual framework of the project** A basic understanding of Education for Sustainability and Action Research is critical if the evaluator is to be able to assess the value and limitations of this process to achieving change towards sustainability within higher education.
- **The facilitator plays a critical role.** By involving themselves in such a project, the lecturers are placing themselves in a potentially threatening situation. They are engaging with a new research paradigm and are involved in group learning situations with their peers. It is important that they feel comfortable in the group situation to share their frustrations and challenges. The facilitator has to be able to empathise, have the ability to create opportunities for reflective thinking, deal sensitively with people who are used to being the teacher (not the learner) and maintain professionalism in providing feedback and encouragement.

11 WHAT DID ACTS ACHIEVE?

The evaluation conducted by Dan Garlick will provide an assessment of project achievements. His report will be submitted independently to the Australian Government Department of the Environment and Heritage.

The following section outlines what the ACTS project team has evidenced as achievements of the ACTS project.

11.1 Action Researchers

The majority of the university staff who participated as Action Researchers through this project:

- Have a **greater understanding** of sustainability and Education for Sustainability.
- Have been able to **see the links** between their specialisms and sustainability/Education for Sustainability.
- Have increased **interest, confidence and motivation** to engage with sustainability and Education for Sustainability.
- Have developed and put into **practice tools and methodologies** for teaching graduates about sustainability within their specialist areas/courses.
- Have challenged their **mental models and teaching practice** so that they can better develop skills for sustainability amongst graduate students.
- Have **changed their course content, guidelines, assessment and/or resources** to better address sustainability and Education for Sustainability.
- Have explored ways of improving their **teaching approaches** to enhance **graduate skills** in this area.
- Have **explored graduate skills for sustainability**. In addition, a few Action Researchers have begun to **consider employers' needs in sustainability** and Education for Sustainability.
- Have begun to **understand the process of and taken actions to embed sustainability** within the core activities of a department and/or institution.
- Have worked collaboratively with other colleagues to extend the project goals/ methodologies beyond the ACTS project.
- Have **written papers about their learnings and experience** in the ACTS project which have been submitted to academic journals or presented at conferences nationally and internationally.
- Two Action Researchers have since decided to take **undertake a PhD in an area related** to Education for Sustainability and/or Action Research.
- Are acting as **champions** communicating the importance and implications of sustainability and Education for Sustainability to others within their departments/universities.

This list is based upon evidence collected, and observations made from the workshops, meetings and submissions to the ACTS team during the course of the project. We are hoping the evaluators report will a) confirm these achievements and b) document and provide the evidence to support the ACTS Team's experience and observations.

11.2 External Stakeholders

- **Generated interest and awareness for the approach in creating change in curriculum:** A high level of interest was generated by the project promotion. Stakeholders who approached the ACTS Team were looking for practical tools/methodologies for motivating universities to engage with sustainability in the curriculum. There appeared to be recognition that it is easier to green the campus than to change the curriculum. The correspondence we received documents the need for practical approaches and support for others working in this area. The lack of resources, opportunities and support for professional and curriculum development in Education for Sustainability were highlighted.
- **Created links with international stakeholders:** The Action Researchers from the ACTS project were encouraged to link with the stakeholders that approached us. This enabled learning to be shared. Peter Cocoran Blaze (University leaders for a Sustainable Future, USA), Pip Lynch and Pam Williams (NZ Champions in Education for Sustainability within the university sector), and Stephen Sterling, (expert in Education for Sustainability, UK) visited the Action Researchers during the course of the project.
- **Stimulated a network for sustainability:** The ACTS Team presented a paper at the NSW 'Effective Sustainability Education' conference which took place at UNSW in February 2004. The presentation generated a great level of interest and led to a discussion about establishing a national network for those champions struggling to address this area within universities. Two weeks later, Ian Thomas established an email group to link those present at the paper session as well as others with interest in this area.
- **Raised the profile of the pilot internationally:** The ACTS project team received funding from Macquarie University's International Office to share initial learnings with others by attending a number of international meetings in Europe, Africa and US. The ACTS project staff was also invited to visit the University of Cambridge, UK and Rhodes University, South Africa to discuss the innovative design. Advice from these leading universities suggests that this project is leading edge in advancing sustainability within higher education.
- **Received requests for collaboration and dialogue:** We have received an influx of correspondence from university academic staff, business, industry, and government requesting opportunities to collaborate and establish a dialogue on how to work towards sustainability. This offers many opportunities for extending the learnings and experiences of this project. The ACTS team were involved in leading a funding application to the Environmental Trust Fund for a large project involving six universities in NSW in extending the ACTS project. The proposal was unsuccessful. Other funding opportunities will be sought.
- **Interest expressed by University Operations:** The initial call for involvement of university staff in the ACTS project generated interest within management and operations at Macquarie University. As a result the ACTS Team supported changes at a range of levels within the University. For example, Students at Macquarie (SAM) approached the ACTS team regarding their initial plans to promote a litter awareness competition across campus. After a few brief meetings SAM decided to focus on a process of reorienting management and operations to be more closely aligned with sustainability. The ACTS Team helped SAM find an external facilitator (Ecosteps) who could help them with this task. This process is now being implemented and has resulted in a number of visible changes within their system.

Also, the Macquarie University Sports Association (MUSA) requested a meeting with the ACTS team to investigate ways of integrating sustainability into their activities. They have since begun to develop sustainable water management plans and meet with academic staff to consider how their practice can be linked to the university curriculum in a formal manner and as part of graduate training for sustainability.

- **Invitation to participate in the GHESP Toolkit Consultations:** The ACTS Team and Action Researchers have been invited to participate in the GHESP Toolkit consultations which have taken place in Japan and US over the past twelve months.
- **Inter-university relationships established:** Two senior members of staff from the University of New South Wales also joined Macquarie University participants in the workshops and subsequent meetings. We consider this inter-university relationship to be very important to ensure that we extend the impact of the project to other institutions. We have also begun discussions with Southern Cross University regarding the project. A member of the ACTS project has also shifted to Griffith University, creating another connection.

11.3 ACTS Team

- **Learning from Experience:** The project provided an opportunity for ACTS team members to extend their skills in Action Research and Education for Sustainability. It also provided an opportunity to learn about how to motivate and engage within higher education – a notoriously difficult sector to involve in sustainability curriculum issues.
- **Partnerships:** The project has also provided an important channel for linking the ACTS team to national and international champions wrestling with this area.

12 WHAT NEXT?

12.1 Action Researchers

The Action Researchers were involved in a final focus group session which took place in August 2004. The session was taped to provide a record of the participants' reflections on their own projects, but also on the Action Research component of the ACTS project.

They were specifically asked the question: 'What next?'

[Excerpts from digitally taped final group session 23 August 2004]

- **Continuation of Action Research projects:** The Action Researchers expressed their commitment and enthusiasm to continue with their Action Research projects. The participants were also enthusiastic about continuing their group meetings and team spirit.

"The group meetings have been very helpful...as I've said before they have given me the structure...reminders..."



- **Documenting and sharing their experiences:** Many are considering how they can share their work with other colleagues through the medium of Teaching and Learning Committees; departmental meetings, coffee clubs etc. Action Researchers expressed an interest in documenting their experiences formally within a book which could be used by other academics struggling with this area of learning. Some have begun to write papers for academic journals.

“That would be ideal. Our local support group which we’ve mentioned...Sustainability Coffee Club...to be able to formalise that would be terrific. They would be renegade as would be outside the formal research structure of the faculty. It would be fantastic....though who leads us?”

“I need to redesign my research...in this direction...I could present the research to the faculty informally about what I’m doing and give them an opportunity to test it.”

“There is another challenge...Our Masters of Sustainable Development is up for grabs at the moment quite literally, in terms of its content and

Also, many have or will be presenting their projects at international and Australian conferences. This was a formal commitment outlined in the learning contract.

- **Briefing Papers:** One of the Action Researchers argued that it would be useful to prepare briefing papers from the perspective of each discipline showing sustainability to be relevant and not just a buzzword. They could be downloaded and submitted to Teaching and Learning Committees or in support of submissions associated with Divisional or Departmental strategic planning.

“When I’ve been and spoken to professors about my planned project of EFSD in Tesol teacher education they tend to roll their eyes at the word sustainability...perhaps it would be good if there was more visibility in the university and understanding about what that actually meant and it was of any relevance at all to linguistics or early childhood education.”

In relation to briefing papers: “Action research part may be more accessible rather than sustainability...you are on safer ground, who can argue with improving your teaching...”

“it could be improved with more examples, tangible things...what do I actually do...those sort of examples...people looking at the actual things that you’ve done in your unit to operationalise these principles.”

- **Continuing to develop partnerships:** Through the process of their research, the Action Researchers have started to develop partnerships with other departments, universities and industry. These partnerships will continue in line with the Action Researchers continuing their projects.
- **In search for funding to extend projects and involve close colleagues - so changes take greater root within the faculty:** Action Researchers committed to seeking funds so that they can extend their experience and involve their close colleagues in sustainability and Education for Sustainability. Rooting the change they have initiated was seen as an important priority.

- **Recommended that the Action Research project was worth doing at another university:** They were asked specifically whether they thought the Action Research was worth doing in another university. The response was a resounding yes. If the project is run again in the university, it was suggested that it could focus specifically on those involved in hard science, or those whose teaching has direct implications for sustainability - *'If you are learning physics, IT etc, what does it mean when they go into the work force and the choices graduates make for employment?'* This may involve targeting particular departments.
- **Forum for sharing their experiences with other universities:** Action Researchers expressed an interest in sharing their experiences at a forum with university staff from across Australia. This forum could help build momentum and partnerships to sustain the commitment of the Action Researchers.
- **Reflective teachers groups:** Ongoing reflective groups organised for a broader audience within the university were suggested such as an Action Research teachers group or a teaching for sustainability group.

"There was a reflective teachers group...which apparently isn't around anymore...I think there should be something similar like that...an action research teachers group or a teaching for sustainability group...it would really be good to have that space where you can go with people and keep the motivation up as it does really tend to flag when you don't have that structure"

- **Recommended a new group of staff undertake the Action Research process at MU:** An Obvious stage 2 for the group was doing the process again across Macquarie University from the start. For example, in one of the Divisions they have teacher workshops periodically. They talk about assessment, international students etc. In November, one of the ACTS participants is speaking on sustainability and this could be a prime opportunity to advertise the project, advise of the start date and *"that you should get on board"*. *"The way I would put it for that audience is that this is looking at how the principles of sustainability apply to your unit and how to improve your teaching in a much more rigorous way..."*. There could be potential for a Vice Chancellors teaching development grant for such a process. One of the participants committed to finding out what other sources of funding existed for taking this idea further. It was argued that documenting the experiences of ACTS would assist others embarking in this new round.

"One of the strengths of the process is engaging with people in different faculties."
"This is a great strength"
"I agree"

12.2 ACTS Team

The ACTS Team believe that the model developed by this pilot can be extended /adapted to be of relevance to other universities working at the postgraduate level.

The focus of this project has been on postgraduate courses. We therefore do not recommend that the findings of this pilot are transferred across to other levels or institutions. There is a need to undertake further research to ascertain the relevance of this model for undergraduate education. Undergraduate teaching presents its own challenges to sustainability. It would also be useful to research and assess the potential of this model for the VET sector which operates under very different structures and demands.

With small amounts of funding, the resources developed by the ACTS project could be modified and extended to serve as a tool to assist champions from other institutions.

Evaluation of the impact of the ACTS project in two years time is also strongly recommended. The Action Research process often sees its most significant outcomes after two years of implementation.

The ACTS Team will continue to work in partnership with the Action Researchers and other external stakeholders who are keen to extend the lessons learnt from this project and create new opportunities for change towards sustainability within this sector.

APPENDICES

A PROJECT MANAGEMENT

The project was managed through three important Project Phases:

Development

- Stakeholder mapping and Communication strategy (protocols within the university and externally)
- Team meetings to design the pilot project

Implementation

- Phenomenographic Research
- Action Research
 - Recruitment of participants (advertising and briefing meeting)
 - Training materials and resources (EFSD, AR, ongoing)
 - Workshop program
 - One on one advisory work (research plans)
 - Ongoing monthly group discussions
 - Critical reflective meetings (critical friends)

Evaluation (outcomes, appropriateness, effectiveness and transferability)

Ongoing evaluation with participants

Post program evaluation with researchers

B STAKEHOLDER MAPPING AND COMMUNICATION STRATEGY

A key to the design of the pilot project was a stakeholder mapping and the communications strategy. The aim was to make available the opportunity for organisations and individuals to influence the design, and for the team to influence learning in Action Research and sustainability. It was a complicated process and took a great deal of time and effort and thinking, ensuring university protocols were adhered to and we covered the mapping of internal and external stakeholders. Internal stakeholders were approached via letters, phone calls, flyers, presentations during Teaching and Learning Committee meetings, articles in newsletters and inductions for new staff members. External stakeholders were approached via letters, phone calls and emails.

The following is an example of an article placed in the Students at Macquarie newsletter:

Change in Curricula and Graduate Skills Towards Sustainability: Action research for Change Towards Sustainability (ACTS)

An important and innovative research project is taking place at Macquarie University with lecturers of postgraduate course work units. The research involves lecturers of postgraduate units in Action Research to change curriculum, with the ultimate aim of preparing graduates to meet the needs of industry and business in moving towards sustainability.

The project has its beginnings in November 2001, when Macquarie University and Environment Australia held a University-Industry Summit. Participants identified the need of university graduates to have attributes such as critical, creative and futures thinking skills, confidence to deal with uncertainty, and awareness of sustainability.

Further, it was acknowledged that many educators are grappling with the issue of how to integrate knowledge of sustainability and skills into their discipline areas. A key recommendation was that research be undertaken in the area of Education for Sustainability.

The project has commenced and received international and national interest from PhD students, other universities, government, consultants and industry.

If you would like to find out more about this project and wish to be kept informed, register your interest with Dimity Podger, 612-9241 5655, Email: dpodger@gse.mq.gov.au for updates.

Further, the Research Team welcomes the opportunity to discuss the project with you should this be of interest.

The project is being conducted by:

Dr Daniella Tilbury - Senior Lecturer Macquarie University, Graduate School of the Environment, 612-9850-7981, Email: dtilbury@gse.mq.edu.au

Dr Anna Reid, Senior Lecturer Macquarie University, Centre for Professional Development, 612-9850 9780, Email: areid@mq.edu.au

Associate Professor Anne Burns, Division of Linguistics and Psychology, 612-9850 8030.

This project has been funded by Environment Australia and Macquarie University External Collaborative Grants Scheme



Internal stakeholders included:

- Participants - lecturers of postgraduate units;
- Vice and Deputy Vice Chancellors, Heads of Division, Heads of Department, Teaching and Learning Committees; and
- Students.

External stakeholders included:

- NZ Parliamentary Commission for the Environment – Sustainability;
- Industry Advisory Group;
- NSW Council for Environmental Education;
- University Leaders for a Sustainable Future; and
- Australian Vice Chancellor Committee.

As a result of the targeted communications strategy with key stakeholders, the ACTS project generated significant interest both nationally and internationally. Individuals and organizations have written offering support and encouragement, stating their willingness to collaborate, and expressing interest in the results.

In response we have actively following up interest through forming E-Lists for those within the university environment and those outside the university environment. To those involved in higher education, we have expressed our interest in exploring genuine opportunities for collaboration. To those outside of the university environment we have thanked them for their interest and provided an overview of progress, which we continued to do.

The project has been formally communicated through a project brief, conference presentations and research design courses.

To date the project has been communicated by the ACTS Team as follows:

- Formal presentations during the Sustainability Education Conference (University of NSW, 18-20 February).⁶
- Guest session during the Environmental Education Research Design Course, Rhodes University South Africa.
- Formal Meetings specifically arranged with the Centre for Sustainable Development associated with the Engineering Department, Cambridge University, and Forum for the Future, based in London.
- Dissemination of the ACTS colour brochures and project briefs disseminated through conference proceedings and to interested stakeholders.
- Informal presentations during the GHESP Toolkit consultations in Tokyo, Japan and Vermont, USA.

⁶ Daniella Tilbury and Dimity Podger were accepted to present ACTS during a Sustainability in Higher Education conference being held by EFS West, Oregon Portland, however they are unable to attend.

The Action Researchers have also been extensively involved in communicating the study through:

- Formal presentations in Germany and Portugal (Ros Taplin), Perth (Jenny Godfrey), Seoul Korea (Mira Kim).
- Research projects involving colleagues.

C PHENOMENOGRAPHIC RESEARCH

This component of the ACTS projects explored how academic staff involved with teaching postgraduate students understand the role of teaching for students' professional formation, the manner in which sustainability is understood and integrated within their units, and how the idea of 'creativity' can be utilised to develop quality learning programs.

The study comprised a series of interviews with university academics, who are teachers of postgraduate students, asking them a series of questions about sustainability and their teaching and then using a phenomenographic approach to analyse the data which seeks to explore the range – or variation – in the academic's understanding. This is an important component of the study as the academics involved in this stage of the research are not from 'life sciences' areas and yet must embed within their curriculum processes and actions that will contribute to the professional formation of their postgraduate students. Sustainability is one such concept.

Fourteen academics from all of the Divisions of Macquarie University, encompassing disciplines as diverse as mathematics, music, actuarial studies and early childhood for instance, participated in hour long in-depth interviews focusing on how they understood the ideas of sustainability and creativity in relation to their teaching. The transcripts were analysed using a research approach that focused on different ways of experiencing within the group. The analysis has yielded a series of conceptions of teaching for sustainability. These are presented in the 'proof' copy of the article for the journal, 'Higher Education' attached to this report. This is an international journal with a readership in excess of 4,000 senior academics worldwide. It is one of the 'highly regarded' journals and reaches a general readership as well as people who make policy decisions.

These findings have important implications for the integration of sustainability with university curricula as we have established the essence of different ways of understanding sustainability and the relations this has with academics' understanding of teaching and how they then go about constructing their teaching practice.

Two other papers have resulted from this aspect of the project:

- Reid, A. & Petocz, P. (2004, in press) What is Sustainability in the Arts? 2nd International CLTAD Enhancing the Curricula: Art Design and Communication Education. April, Barcelona.
- Petocz, P. & Reid, A. (2003) What on earth is sustainability in mathematics? New Zealand Journal of Mathematics 32: Supplementary Issue, 135-144.

These two papers were intended to bring the issues of sustainability into the areas of art and mathematics education. They were presented at conferences with attendance at the art session of 35 and over 40 for the mathematics. In November 2004, another seminar for the regular 'teaching and learning workshop' in the Faculty of Economics and Financial Studies has been organised. In all of these cases the findings from the ACTS project have been integrated with discipline specific research outcomes on student learning and curriculum development.

D ACTION RESEARCH

D.1 Recruitment of participants (advertising and briefing meeting)

A briefing meeting was conducted for potential participants on 21 February 2003, outlining intentions and outcomes sought by the ACTS project and inviting expressions of interest from teaching staff from across the campus. The project attracted interest from various Divisions with 10 individuals attending the two-hour meeting. Those who attended were asked to confirm their interest by the end of March.

D.1.a Initial Advertisement

An excerpt from the initial advertisement placed in pigeon holes of lecturers of postgraduate units, included in letters to Heads of Department for distribution to relevant staff and placed in the newsletter called Staff News is included in the following page.

D.1.b Expression of Interest and Learning Contract

Each participant submitted an Expression of Interest form to outline their interest and potential project focus. They were also required to formalise their involvement through a learning contract which committed each to the objectives, time-scale and intended outcomes of the project. They are included in this Appendix.

RESEARCH OPPORTUNITY FOR TEACHERS OF POSTGRADUATE COURSE WORK

Action research for Change Towards Sustainability (ACTS): Change in Curricula and Graduate Skills Towards Sustainability

FORMAL RECRUITMENT PERIOD (Early Semester 1, 2003)

Action research for Change Towards Sustainability (ACTS) is an important innovative pilot research project taking place within Macquarie University. The University was selected by Environment Australia to develop this significant initiative.

The project combines two research methodologies to a) explore sustainability and creativity across disciplines through phenomenographic research and b) assist curriculum change through Action Research, with the ultimate aim of preparing graduates for professional work.

It is the second component that is the focus of this Announcement. The focus of the project is:

- Professional development of teachers of postgraduate units in Education for Sustainability;
- Cross faculty involvement;
- Exploring research based activities to enhance professional development for sustainability; and
- Developing of post graduate skills to meet the needs of industry and business in moving towards sustainability.

Formal recruitment has begun - Are you interested in participating?

- Q Are you a teacher of postgraduate units?
- Q Are you interested in gaining experience in Action Research?
- Q Are you interested in the opportunity to publish your own Action Research Outcomes?
- Q Do you have an interest in linking your teaching to the development of graduate skills towards sustainability?
- Q Do you want to develop your teaching and your students' learning for sustainability?

Places for funded participation were limited and as such the Project Team will select interested participants. The Team is aiming to involve participants across disciplines which will influence the final selection.

The project is being conducted by

Dr Daniella Tilbury – Graduate School of the Environment, 9850 7981

Dr Anna Reid - Centre for Professional Development, 9850 9780

Associate Professor Anne Burns – Division of Linguistics and Psychology, 9850 8030

If you have any questions or would like to arrange an appointment to discuss the project please contact Daniella Tilbury, 9850 7981, or dtilbury@gse.mq.edu.au.

To register your interest and receive an expression of interest form please email Dimity Podger, Project Manager, dpodger@gse.mq.edu.au.

EXPRESSION OF INTEREST (EOI) TO PARTICIPATE

Project Title Action research for Change Towards Sustainability (ACTS): Change in Curricula and Graduate Skills Towards Sustainability

Funding This research project has been funded by Environment Australia in collaboration with Macquarie University.

The project is being conducted by:

Dr Daniella Tilbury, Graduate School of the Environment, 9850 7981

Dr Anna Reid, Centre for Professional Development, 9850 9780

Associate Professor Anne Burns, Division of Linguistics and Psychology, 9850 8030

The project is managed by:

Dimity Podger, Graduate School of the Environment, 0402 121 476

Short Description

Action research for Change Towards Sustainability (ACTS) is an important innovative pilot research project taking place within Macquarie University. The University was selected by Environment Australia to develop this significant initiative.

The project combines two research methodologies to a) explore sustainability and creativity across disciplines through phenomenographic research and b) assist curriculum change through Action Research, with the ultimate aim of preparing graduates for professional work.

It is the second component that is the focus of this EOI. The focus of the project is:

- Professional development of teachers of postgraduate units in Education for Sustainability;
- Cross faculty involvement;
- Exploring research based activities to enhance professional development for sustainability; and
- Developing of post graduate skills to meet the needs of industry and business in moving towards sustainability.

Our Commitment

- Provide support for your involvement as required by your Department
- Providing financial assistance to 10 participants to carry out their Action Research (approx \$1200).
- Facilitation of workshops covering Action Research, Education for Sustainability and Sustainability in Higher Education.
- Provide ongoing mentoring support including advice regarding research plans
- Provide all participants with supporting material (incl. CD Rom of materials)
- Provide support on how to document and publish Action Research
- Participants will retain intellectual property rights over their own Action Research outcomes.



Criteria for Participant Involvement

- You must be a teacher of postgraduate units

Your Commitment

- Attend a briefing session in Semester 1
- Attend 4 days of workshops in Semester 2.
- Commit to thinking, planning and taking action to address sustainability within your teaching to postgraduate students
- Commit to submitting a paper outlining lessons learnt and reflection on the process of your Action Research
- Commit to being part of the evaluation of the overall Action Research project itself
- Obtain ethics clearance for your own individual projects
- Monthly progress reports by email

If you decide to participate, you are free to withdraw from further participation in the research at any time without having to give a reason and without consequence.

Project Time Frame and Scheduled Activities

The time frame will be set following the selection of participants to ensure convenient for all.

Project Briefing	21 st February 2003 (12.30pm to 2.00pm)
Workshop Session 1	early-mid August 2003
Workshop Session 2	mid-late August 2003
Group Meetings	Monthly over Semester 2 2003 and Semester 1 2004 (possibly lunch times)

Research Outcomes

The outcomes of the project could include curriculum change, development of partnerships or steering committees, change in teaching and learning approach, change in departmental policy and process, and development of new resources.

Participant Selection

Places for funded participation are limited and as such the Project Team will select interested participants. The Team is aiming to involve participants across disciplines which will influence the final selection.

Next Steps

- Complete and submit attached Expression of Interest Application as soon as possible.
- Email or mail to Dimity Podger, Project Manager, dpodger@gse.mq.edu.au
- Mark in your diary the briefing meeting

Look forward to us working together!

Expression of Interest Application

Your Details

Name:

Position:

Postgraduate units you are teaching:

Division:

Department:

Responsibilities:

Email:

Phone: 612

Fax: 612

Informal biography (this will be forwarded to participants selected for the project):

Will you be needing financial assistance for teaching release: Yes No

Project Details

Outline your initial thoughts on your project focus:

How can we help you to gain political support? (eg attend Teaching and Learning Committee or Departmental meetings; write a letter of support)

Provide the dates during Semester 2 that are impossible for you to attend workshops or briefings:

Provide the dates you would be able to attend a POTENTIAL 2 day seminar involving international participants working a similar area as this Action Research project. Provide possible dates between the last week in October and 1st week in November

Email your completed application to Dimity Podger:
dpodger@gse.mq.edu.au, Graduate School of the Environment.

The information provided in this document is confidential except where advised otherwise.



Learning Contract

Please submit by 1 June

Welcome to the ACTS project. Action research for Change Towards Sustainability (ACTS) is an important innovative pilot research project taking place within Macquarie University. The University was selected by Environment Australia to develop this significant initiative. The project combines two research methodologies to a) explore sustainability and creativity across disciplines through phenomenographic research and b) assist curriculum change through Action Research, with the ultimate aim of preparing graduates for professional work. The focus of the project is:

- Professional development of teachers of postgraduate units in Education for Sustainability;
- Cross faculty involvement;
- Exploring research based activities to enhance professional development for sustainability; and
- Developing of post graduate skills to meet the needs of industry and business in moving towards sustainability.

This program is jointly funded by Environment Australia and Macquarie University (MU) and will therefore require commitment of research facilitators and Action Researchers with respect to their responsibilities. This learning contract outlines the responsibilities of those involved in the Action Research component.

Our Commitment

- Provide support for your involvement as required by your Department
- Providing financial assistance to 10 participants to carry out their Action Research (approx \$1200).
- Facilitation of workshops covering Action Research, Education for Sustainability and Sustainability in Higher Education.
- Provide ongoing mentoring support including advice regarding research plans
- Provide all participants with supporting material (incl. CD Rom of materials)
- Provide support on how to document and publish Action Research
- Participants will retain intellectual property rights over their own Action Research outcomes

Criteria for Participant Involvement

- You must be a teacher of postgraduate units

Your Commitment

- Attend a briefing session in Semester 1
- Attend 4 days of workshops in Semester 2
- Commit to thinking, planning and taking action to address sustainability within your teaching to postgraduate students
- Commit to submitting a paper outlining lessons learnt and reflection on the process of your Action Research
- Commit to maintaining a journal / portfolio documenting thoughts, reflections and ideas
- Commit to being part of the evaluation of the overall Action Research project itself
- Obtain ethics clearance for your own individual projects
- Monthly progress reports by email

In addition there will be working group meetings which we advise that you attend. However, these are not compulsory.

If for any reason, you are unable to meet your commitment as outlined above, we would expect reimbursement of project funds allocated to you.

I _____(print name) agree to the above conditions of the Learning Contract.

The number of hours for which I require teaching/research support are _____

Please transfer funds to the following account _____

Signed

Date / / 2003

We, the Team, agree to the above conditions of the Learning Contract

Signed

Date 13 / 05 / 2003



D.2 Training Materials and Resources

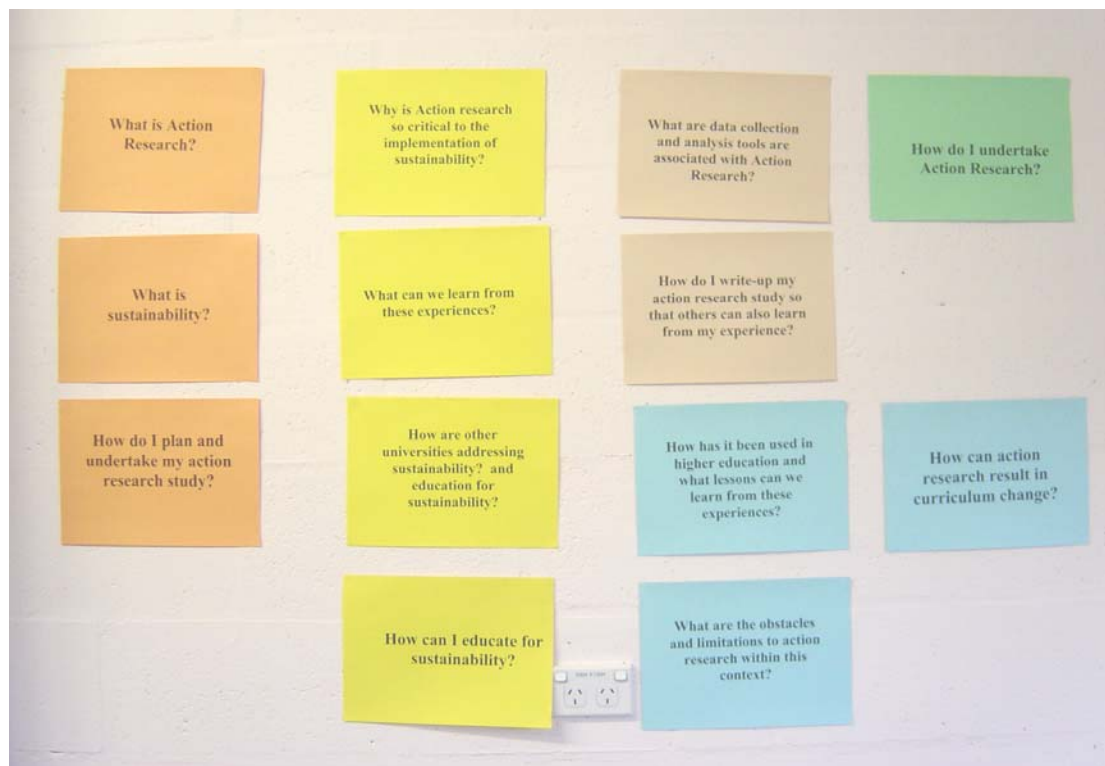
It was a large task preparing the CD Rom, which contains many electronic readings. These readings, whilst not exhaustive, provided a base for the participants and their Action Research project. Resources were provided because it was recognised lecturers were time poor. The copyright procedures of Macquarie University library were followed in its preparation.

The Handbook provided to each participant contained the bibliography for the CD.

E WORKSHOP PROGRAM

Following from the first training workshop held in August 2003, three days of workshops were held in November 2003. The key questions covered during the workshops are presented in Figure E-1.

Figure E-1 Key Questions Addressed in the Workshop Program

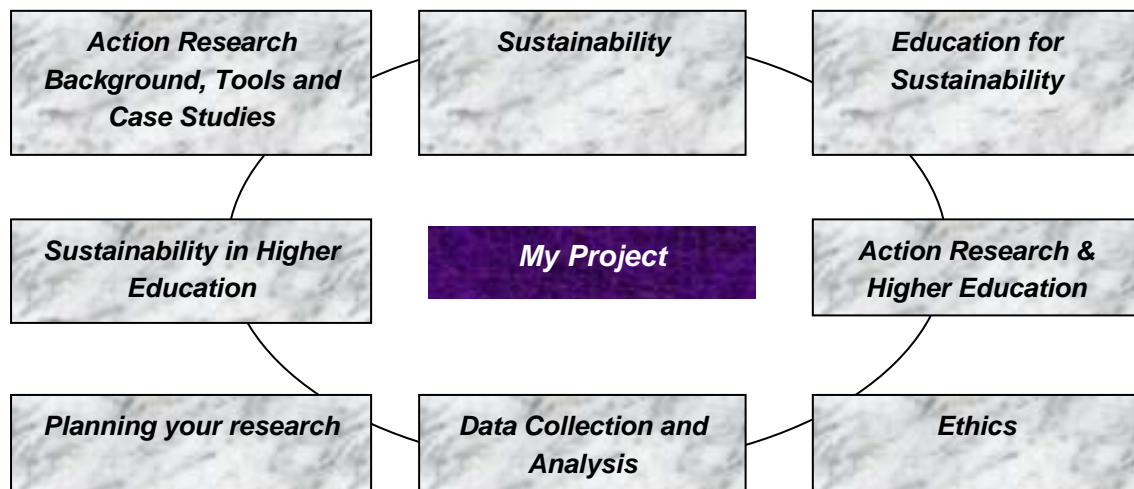


The workshops were designed to reflect the principles of Education for Sustainability. They were collaborative, reflective and used participative and action learning processes and activities to build confidence and expand participant comfort zones.

Participants were referred constantly to the handbook and CD Rom and other resources we prepared. The workshops also piloted new learning activities, provided the opportunity to discuss case studies presenting good practice, covered international declarations relevant to sustainability in higher education, and provided examples of tools participants could use to reorient their curriculum towards sustainability. All participants attended the workshops and the two non-funded UNSW participants attended two days.

In summary, the areas depicted in Figure E-2 were addressed ensuring the participants had the necessary components to assist them with their research.

Figure E-2 Workshop Focus Areas



At the end of the session on each day, the participants were asked to provide feedback on their thoughts of the day and anything they would like to share or for us to improve. The feedback from participants was very positive with comments including very enjoyable, intellectually stimulating and demanding, promoted critical thinking, well organised and planned, assisted by conceptual congruence, and useful experiential activities. Participants also identified activities they could transfer to their own teaching environment. At the end of Day 3, participants commented they were ready to think about their projects, read more and consider changes to their teaching practice. It was recorded verbatim and included below.

ACTS Workshops Participant Feedback

Day 1 13 November 2003

- “Very enjoyable day went quickly like the ‘active learning’. Keep going this way. 1 suggestion. Urn with hot water in room would be great! Thanks!”
- “I enjoyed a lot I especially like the pair discussions. Thanks!”
- “Overall a good day. 1st session in afternoon a bit slow but closing discussion v. useful.”
- “A very intellectually stimulating day – quite demanding – but very worthwhile (hot water urn in the room would be a help i.e. caffeine to stay focussed). Many thanks and am looking forward to tomorrow.”
- “Well organised and planned. Good balance between T-S and S-S activities. Experiential activities very useful. Don’t change anything!”
- “I enjoyed the day very much – plenty of stimulating material + discussion and a good mix of activities to keep focussed!”

Day 2 14 November 2003

- “I appreciate that the participative activities we do are things I can use in my teaching. They are engaging without being annoying. Thanks also for all the power point sheets – allows me to concentrate on what’s being said.”
- “Conceptual congruence produces an effective and enjoyable teaching/learning experience. Cognitively demanding, but an enjoyable stretch. Thanks for vego food.”
- ‘great we’ve finished on time! Another day of intellectually challenging days. A good opportunity to think through various concepts which I should include in my project. Thanks!”
- “A good day – plenty of food for thought – a good pace!”
- “Another fascinating day with stimulating new knowledge and participation to promote critical thinking – many thanks.”
- “great exercises, exemplifying AR methods. Lots of good information to absorb
- “would be good to have more time to absorb reflect Good lunch!”

Day 3 17 November 2003

- “Thank you Daniella & Dimity – The workshops have been stimulating and challenging – I look forward to learning more!!”
- “Many warm thanks for your wonderful workshops! I’ve learned a lot and now have a lot to think about!”
- “Another good day. Thanks for all your work – looking forward to the journey!!”
- “Another eye opening day – again the activities and structure are very helpful. Generosity with information and time is very appreciated.”
- “More good activities and things to think about, ponder, take home and consider how I can use them in my practice. I am gaining some clarity as to my own self identity as an ‘Action Researcher’.”
- “The third day has continued to expand and challenge my mental model of research. Thank you for 3 stimulating days – all day! Now - the reading.”
- “Today was very useful in terms of planning and thinking about research projects and ethics. Now is the challenge to map out the project. Will we cooperate and do PAR – I hope so. Thanks.”



F ONGOING MONTHLY GROUP DISCUSSIONS

A total of four sessions were held from March through August 2004. There were two groups of four and five respectively to provide for a smaller group discussion. For the final session in August the two groups were joined and each participant presented their project to the group. The discussion topics for the sessions were developed from suggestions of the participants and evaluation sheets they completed at the end of each meeting.

The discussion topics included:

How your project is Action Research (AR) in terms of:

- a) your research question;
- b) what principles underpin the design of your research plan; and
- c) the data collection methods chosen and how they also consider the principles of AR.

How your project contributes to change towards sustainability in terms of:

- a) your research question;
- b) what principles underpin the design of your research plan and the actions you are taking; and
- c) the data collection methods chosen.

Experiences in using data analysis methods, which are congruent with Action Research.

Experiences of your first Action Research cycle (if applicable to you).

Research Plan revision

Project findings including 'where to next?', 'what does that experience mean for future cycles?'

G PARTICIPANTS AND PROJECTS

The following informal biographies of all participants taking part in ACTS have been compiled from the Expression of Interest forms. They are in alphabetical order.

Macquarie University

Robyn Beirman

Department: Health and Chiropractic

Position: Lecturer

I am a lecturer in the Department of Health and Chiropractic, teaching in the disciplines of Pathology and Differential Diagnosis. I am medically qualified and have a particular interest in the educational process of health practitioners, as well as complementary forms of healing.

Jennifer Godfrey

NCELTR

Position: Lecturer

I began my career as a secondary French teacher and moved from there into adult education, teaching English as a foreign language in Europe and then working with migrants in Australia. For the last 11 years I have been teaching ES:/EFL teachers, with forays back into the classroom when I can get them. I worked for 10 years in the School of Adult Education at UTS, and have been at NCELTR since 2001. I have a strong interest in Environmental issues, particularly community environmental education. I'm a Bushcare Volunteer and a Fishcare (yes!) volunteer and I enjoy walking in the bush and paddling in my kayak.

I've worked with teachers from Thailand, Laos and Cambodia, both in their countries and Australia. Participating in this project will give me an opportunity to think about how my, and that of the people I teach, can contribute self-renewing curricula in TESOL.



James Hazelton

Department: Accounting and Finance

Position: Associate Lecturer

Work Experience

- 2001 present Associate Lecturer, Macquarie University
1999 – 2000 Risk Management Consultant, PwC London – responsible for client service
1998 Risk Management Consultant, PwC New York – responsible for product development, practice administration and training
1994 – 1999 Auditor, Coopers & Lybrand Sydney– specialising in financial services

Qualifications

- 2003 Commenced PhD, Graduate School of the Environment, MU
2002 Postgraduate Diploma in Environmental Studies, Graduate School of the Environment, Macquarie University
1996 Member of the Institute of Chartered Accountants
1993 BEc (Hons) Macquarie University

Research Interests

Ethical investment, triple bottom line reporting, corporate social responsibility

Judi Homewood

Department: Psychology

Position: Lecturer

My first year on staff at Macquarie was 1983. I became a tenured staff member in the mid 1990s after several fixed term contracts and time off teaching to complete a PhD and for maternity leave. I teach on six different units, and am unit convenor on three undergraduate and one postgraduate unit. My most recent research has used non-human animals (rats) to investigate the biological basis of methadone-induced memory impairments. A second line of interest is in investigating cognitive compensation in blind children using olfactory learning and memory, and in odour-taste synesthesia.

Mira Kim

Department: Linguistics

Position: Associate Professor

Born and educated in Korea, started my career as a professional interpreter/translator in 1995, moved to Sydney, Australia in 2000 and currently teaching translation practice in Translation and Interpreting Postgraduate Programs of Macquarie University. Also actively involved in the translation industry of Australia.

Susan Shearing

Department: Law

Position: Associate Lecturer

I was admitted to practice in 1986 and worked for 6 years with a large Sydney law firm. I then worked in the Legislation and Policy Division of the NSW Attorney General's Department advising principally on corporate matters, while completing a Master of Laws degree specialising in environmental and administrative law subjects. My particular interests are heritage, local government and planning law and administrative law.

Ros Taplin

Graduate School of the Environment

Position: Lecturer

Ros Taplin joined the GSE at the start of 2003 to lead the Environmental Management Program within the school. She was formerly a Principal Environmental Consultant in SMEC's (Snowy Mountains Engineering Corporation) Sydney office and has more than 15 years research and consulting background in international and Australian environmental policy and climate change. Before working for SMEC, Ros held positions with ACIL Consulting, as Director of the Climatic Impacts Centre at Macquarie University, at RMIT and at the University of Adelaide.



External

Linda Corkery, UNSW

Faculty: Built Environment

Position: Head of School, Landscape Architecture

I am a landscape architect and planner (MLA and MRP, Cornell University; BSc, Iowa State University) with 20 years professional experience in Australia, the United States and Hong Kong. In 1999, I joined UNSW's Faculty of the Built Environment as a Senior Lecturer and Head of Program for Landscape Architecture. My responsibilities include teaching design studios, an environmental planning elective, environmental sociology and professional practice subjects. I also guest lecture in the FBE's Master of Sustainable Development program. My research work is focused on ecological design/landscape design for sustainability, people-place relationships and teaching/learning in design disciplines.

Catherine Evans, UNSW

Faculty: Built Environment

Position: Head of Program, Landscape Architecture

I am a landscape architect with 10 years professional experience in Australia and the United States. I have an undergraduate degree in art and urban histories (Vassar College), and a Master of Landscape Architecture (University of Pennsylvania). I joined the Faculty of the Built Environment at UNSW as a Lecturer in the Landscape Architecture Program in 2000. I teach in several areas: design studios, ecology/environment, and history/theory. My research is focused on ecological design/landscape design for sustainability, heritage designed landscapes, and teaching/learning in design disciplines.

Matthew Haigh (commenced the project with Macquarie University, now with Griffith University)

Department: Accounting and Finance

Position: Lecturer

Work Experience

2003	Lecturer, Macquarie University
2000–2002	Business Review Consultant, Westfield Holdings– responsible for operational reviews and assessments in Australia and New Zealand
2001	Management Accountant, Leighton Holdings – responsible for special services accounting and payroll services
1999–2000	Auditor, BDO Chartered Accountants, Sydney– specialising in financial audit, IT audit, and professional training
1996–1999	Auditor, Audit Office of NSW – specialising in financial audit and IT audit

Qualifications

2000	Member of Information Systems and Audit Association (U.S.A.)
1999	Master of Commerce in Professional Accounting Macquarie
1999	Member of the Institute of Chartered Accountants
1996	Bachelor of Commerce Macquarie

Research Interests

Socially responsible investment, triple bottom line reporting, corporate social responsibility

H PARTNERSHIPS AND COMMUNICATION

During the project, the ACTS Team extended opportunities for partnerships between organisations and institutions to form and develop and for stakeholders to contact the Team and be a part of the learning experience of the project. Communication for external stakeholders took the form of an emailed or hard copy project brief and extending an invitation for collaboration (included in this Appendix). The following lists the internal and external stakeholders with whom the ACTS Team communicated.

Internal

- Participants - lecturers of postgraduate units
- Vice and Deputy Vice Chancellors, Heads of Division, Heads of Department, Teaching and Learning Committees
- Students

External – National

- Industry Advisory Group
- NSW Council for Environmental Education
- National Environmental Education Council
- Australian Vice Chancellor Commission
- Richard Sebo, Manager Research Business Development, Faculty of the Constructed Environment, RMIT University
- Rosemary Cousin, Director, Integra Planning Pty Ltd & Postgraduate Research, Melbourne University
- Steve Rodgers, Land and Water Australia
- Warren Overton, Energy Conservation Manager, Australian National University
- Assoc. Prof. Francis Parker, Social Ecology School, University of Western Sydney
- Dr David Yencken, Emeritus Professor, University Of Melbourne And Patron Of The Australian Conservation Foundation, Australia
- Suzanne Benn, Research Associate/Lecturer-in-charge, Sustainable Enterprise, School of Management, Faculty of Business, University of Technology Sydney
- Keiko Yasukawa, Coordinator BEd (Adult Ed) Language, Literacy & Numeracy major, Academic Distance Education Coordinator, Department: Faculty of Education and Faculty of Engineering, University of Technology Sydney
- Peter Graham, University of New South Wales (previously Building Ecology, Lecturer - Sustainable Construction Dept. Building & Construction Economics, RMIT University)
- Joy Hardy, Education lecturer, course coordinator at University of Queensland
- Karen Bubna-Litic, Director of Research, Faculty of Law, University of Technology, Sydney



External – International

- Alan Jenkins, Associate, LTSN Generic Centre Westminster Institute, Oxford Brookes University
- Alun Morgan, Lecturer, Geography Education Institute, Education University of London
- Christiane Dorion, invited to join the IUCN Commission on Education and Communication, PhD in environmental education in the UK, was lecturing at Laval University Quebec
- Clair Challen, PhD student at St. Martins College, Lancaster, UK, studying sustainability in higher education with particular interest in embedding a sustainability curriculum for all graduates
- David Hendley, University of Wales
- David Lambert, President / CEO of the Geographical Association
- David Somervell, Scottish Universities Network for Sustainability
- David Speller, National Project Manager, Connect Employment & Training
- Dr Paul Pace, Environmental Education & Science – Maths, Science & Technical Education, Faculty of Education, University of Malta
- Inga Ann Burton, Environment Manager, Scottish Universities Network for Sustainability, University of St. Andrews
- June Thomas, Stow College (UK)
- Mark Rickinson, Senior Research officer, National Foundation for Educational Research
- Mary Joy Pigozzi, Director, Division for Promotion of Quality Education, UNESCO
- Michela Mayer, President of ENSI
- Morgan Williams, Parliamentary Commissioner for the Environment, Parliament Commission, New Zealand
- Alexis Symonds, Assistant Director, Education, Pretoria
- Paul Keown, New Zealand
- Peter Blaze Corcoran, Senior Fellow in Education for Sustainability, University Leaders for a Sustainable Future (ULSF)
- Pierre Haldi, Senior Scientist and Lecturer, Swiss Federal Institute of Technology (EPFL), Laboratory of Energy Systems (LASSEN), ICARE - ENAC(GC)
- Prof. Chamhuri, Universiti Kebangsaan Malaysia (UKM), Institute for Environment and Development
- Prof. Heila Lotz Sisitka, BPrim Ed (UPE), B Ed, DEd (Stell), Murray and Roberts Chair of Environmental Education, Rhodes University, South Africa
- Richard Sanders, NSW Government –senior policy officer
- Sarah Gillman, Project Officer Scottish Universities Network for Sustainability, SISTech, Heriot-Watt University
- Sophie Constance, Director, Constance Creative Marketing Sustainable Living Foundation



I EVALUATION

Overview

An **evaluation** is being conducted as part of the pilot research project to ascertain its transferability to other universities as a means of assisting curriculum change for sustainability. The evaluation will assist in providing valuable information to the facilitators of the Action Research in order to learn from the process and adjust the facilitation. The evaluation will also report against the requirements of the Australian Government Department of the Environment and Heritage highlighting the projects effectiveness and appropriateness in achieving the project goals.

The Evaluators report will describe the evaluation and results in more detail. The purpose of this Appendix is to provide the terms of reference and approach of the evaluation for the ACTS project.

Evaluation Terms of Reference

The aim of the evaluation is to understand the value of Action Research as a method for generating change towards sustainability at the University level.

The evaluation took place throughout the project's duration. It focused on Phase 2 of the ACTS project - *assist curriculum change through Action Research, with the ultimate aim of preparing graduates for professional work*. The purpose of the evaluation was to:

- 1. inform the process of the research;**
- 2. determine the projects impact; and**
- 3. inform future directions of the project.**

Part 1 of the evaluation, **informing the process of the research**, took place throughout project. The purpose of this element of the evaluation was to provide valuable information to the facilitators of the Action Research in order to learn from the process and adjust the facilitation. This occurred in the form of feedback from participants during the workshop, critical friends meetings and project team meetings that occurred throughout the project. A number of key outcomes occurred during the project, as a result of the internal evaluator working closely with the project team.

Part 2 of the evaluation, **to determine the projects impact**, will highlight the key outcomes and determine the success and effectiveness of the ACTS Project. The success of the project will be determined by the extent the project achieved the intended outcomes of the project, which were to:

- develop staff understanding of the concept of sustainability across the faculties;
- provide training in Education for Sustainability;
- implement Action Research for understanding changes required;



- provide professional development on how to integrate these into curricula and delivery of course materials;
- identify and evaluate the approach and any change in training and teaching programs;
- improve the sustainability component of coursework, workplace experience, research training and supervision of postgraduate students across all faculties, and
- develop a best practise model for the development and mainstreaming of generic skills in Education for Sustainability for implementation across tertiary institutions.

The project effectiveness will be determined by the extent the project created change, in the case of this project, change within the post-graduate curriculum toward sustainability. A number of data collection points were used to determine the ACTS project success and effectiveness including:

- Participant surveys;
- End of project participant interviews;
- Participants learning journals; and
- End of project team interviews.

The evaluation report will provide the results of each of these data collection points to identify the success and effectiveness of the project.

Part 3 of the evaluation, “**Inform future directions of the project**”, will report on the transferability of the pilot project to other universities as a means of assisting curriculum change for sustainability. Part 3, in accordance with the Australian Government Department of the Environment and Heritage (DEH) requirements, will determine the transferability of the pilot project based on the projects effectiveness and appropriateness in achieving the project objectives.

Approach

It was important that the approach to the evaluation be consistent with the critical theory paradigm, which underpins the Action Research methodology of the project. The data collection and analysis methods therefore were designed to be congruent with this paradigm.

Evaluation within the critical theory paradigm does not involve an evaluation of the chosen methodology or a comparison of the methodology with another to determine whether the research has been successful, effective and the outcomes are valid. Rather, the research process is considered to be valid by the fact that there are outcomes and the nature of those outcomes. In the case of Action Research, outcomes involving change. Further, in Action Research, the Action Researchers themselves validate the change that has occurred and whether it is valid.

The approach differs also from traditional evaluation, where an external evaluator directs the research. In the ACTS project, the evaluator played a role as team member, informing the research process and learning in return about Action Research.

Data Collection and Analysis

The evaluation of the ACTS project consisted of a number of data collection techniques to ensure the validity of the data. The data collected for each of the techniques was then categorised and analysed, using content analysis, identifying key themes according to the objectives of the evaluation. See Table I-1 for the data collection and analysis framework.

Table I-1: Data collection and analysis framework

Technique	Aim	Process	Categorisation and Analysis
Participant Surveys	The aim of the surveys was to gauge the participants motivations, changes they consider happening as a result of the research and changes in understanding and educational approaches.	The participants were asked to complete 2 surveys, one prior to the workshop and one mid-way through their projects.	The data collected from the surveys was collated by question and responses inserted. The data was then analysed for participant motivations, changes that occurred as a result of research project and the changes in participants understanding and educational approach.
Participant Interviews	The aim of the interviews was to gauge throughout the entire project the participants changes they consider happening as a result of the research and changes in understanding and educational approaches. The interviews also sought feedback on the project design and recommendations for improvement.	At the end of the project each participant was interviewed face to face for between ½ - 1 hour.	Data from the interviews was collected using a tape recorder and interviewer notes. Following each of the interviews, the tapes were listened to and notes analysed to insert participant responses under each question. The categorised data was then analysed for key themes related to the changes they consider happening as a result of the research; changes in understanding and educational approaches and project design feedback.
Participant Journals	The aim of viewing the summary or the journal was to gauge the changes that have occurred through their involvement in the research and to validate responses from surveys and interviews.	Each Action Researcher maintained a journal during their project to capture their learning journey.	These were submitted at the end of the project to the evaluator. The journals provided insight into the participants research questions, learnings and critical reflections, research plans etc.
Project Team Interviews	The aim of the interviews was to identify learnings about the process, its effectiveness, appropriateness and what changes the team would make if the project were to be transferred to other institutions.	Interviews were conducted with each of the project team: facilitators of the Action Research, Daniella Tilbury and Dimity Podger, and the chief investigator for the phenomenographic research, Anna Reid.	Data from the interviews was collected using a tape recorder and interviewer notes. Following each of the interviews, the tapes were listened to and notes analysed for key themes related to the learnings about the process, its effectiveness, appropriateness and what changes the team would make if the project were to be transferred to other institutions.

J GLOSSARY

Action Research

Action Research can be used as a collaborative research tool, which is often represented as a four-phase cyclical process of critical enquiry – plan formation, action, outcome observation and reflection. It aims not just to improve but to innovate practice.

Action Research provides a valuable process for exploring ways in which sustainability is relevant to the university curriculum and can contribute to graduate skills. It views change as the desired outcome and involves participants (in this case academic staff) as researchers of their own practice. In this way Action Research produces more than just a research document. It results in catalytic change for sustainability. Its focus on critical enquiry and continuous self-evaluation makes it a useful tool for professional development. Action Research has been used in the area of curriculum and professional development in Environmental Education as well as other fields.

Conceptual Congruence

Two independent concepts can be said to be Conceptually Congruent when the concepts and goals of each are harmonious or coincide. In this case, the principles and underlying assumptions of Sustainability and Action Research coincide. The shift in perception and the processes of reflection, adaptation and change required to achieve sustainability are similar to the processes and skills required by practitioners undertaking Action Research. In this way the two concepts can be said to be Conceptually Congruent.

Critical Friends

A critical friend is a person who can assist the process of reflection and articulating experiences by asking critical and sometimes provocative questions. A critical friend is sourced from outside the research project and as such can provide an objective and alternative viewpoint of the process. Their role is to provide time for the group (in this case the ACTS Team) to listen to them reflecting on the process and assist in clarifying their thought processes. One benefit of having a critical friend engaged from the beginning of the process is that it provides the opportunity for the team to identify key lessons for the process as it is taking place and also have the ability to adjust the process if required.

Critically Reflective Practitioner (CRP)

A Critically Reflective Practitioner is a researcher who will not only question the use of the research, but challenge the underlying principles that have formulated that research. Critically Reflective Practitioners are those that identify the assumptions governing their actions, locate the historical and cultural origins of the assumptions, question their meaning and then use this new perspective to evaluate their own practice and develop alternative actions. It is generally agreed that the process of critical reflection involves four key elements: assumption analysis, contextual awareness, imaginative speculation and reflective scepticism.

Education for Sustainability

Education for Sustainability motivates, equips and involves individuals and social groups in reflecting on how we currently live and work, in making informed decisions and creating ways to work towards a more sustainable world. In some international spheres 'Education for Sustainability' is also referred to as 'Education for Sustainable Development'.

Education for Sustainability has crystallized as a result of international agreements and the global call to actively pursue sustainable development. Originally perceived as education *about* sustainability it is being increasingly recognized, through the influence of *Agenda 21* and the more recent World Summit on Sustainable Development at Johannesburg, as more than just the dissemination of knowledge. It is now understood that sustainable development is a process of adaptive management and systems thinking, requiring creativity, flexibility and critical reflection. It is these skills that Education for Sustainability seeks to develop.

Mentoring

The mentor is a person who facilitates the process of reflection and supports individual participants in carrying out their planned actions within the workplace. Mentoring is an important component of the process, as it focuses on individual professional needs and supports participants in their own workplace context.

The objective of mentoring is to build the capacity of the person in their working environment to implement change. This can be achieved through a number of techniques either in a group or individual setting. Generally, it provides a space for participants to discuss their plans, observations and reflections, and explore ways of bringing about change towards sustainability within curricula. The mentor acts as a sounding board for issues as they arise, asks critically reflective questions as appropriate and provides ideas, input and additional resources as necessary. Mentoring provides a key role as it bridges the gap between research and practice.



Participatory Action Research (PAR)

Participatory Action Research is a collaborative process in which a group of co-researchers combine inquiry, learning and action. A main component of PAR is that there are no 'experts' and as such all of the group are involved equally in the processes of inquiry and problem solving. PAR seeks to breakdown the traditional hierarchies and power structures experienced between researcher and researched. It is the participants or 'researchers' that have control and ownership of the process, direction of research and ultimately the use of the results.

The process has been used as a form of group Action Research that encourages more open communication and discussion amongst colleagues regarding a specific task or issue. It attempts to promote teamwork and cooperation through inviting participants to share thoughts, experiences and challenges. The group Action Research process invites deeper critical reflection and thinking about change.

Phenomenographic Research

Phenomenographic Research looks at how people experience, understand and ascribe meaning to a specific situation or phenomenon. Phenomenography richly describes the object of study through an emphasis on describing the variation in the meaning that is found in the participants' experience of the phenomenon. The categories are usually reported in order of their inclusivity and sophistication, and they are defined by their qualitative difference from the other categories. Phenomenography examines the experience of each participant and recognises that each person's experience is an internal relation between the subject and the object, in other words, between the participant and the phenomenon.

Sustainability

To live within our environmental limits, to achieve social justice and to foster economic and social progress are the key goals of sustainability (also referred to internationally as 'sustainable development'). The idea of sustainable development owes a great deal to the United Nations, which in 1983 set up the World Commission on Environment and Development (WCED) and promoted *quality of life* for present as well as future generations.

However, the issues underlying sustainable development are complex and they cannot be encapsulated within the diplomatic language and compromises. Sustainability is open to widely *different interpretations* and takes on different meanings not only between cultures, but also between different interest groups within societies. A key aim of sustainability is to enable *multi-stakeholder groups to define their vision* of sustainability and to work towards it.