Redesigning pedagogy to challenge students’ perceptions of sustainability

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Abstract
Recent studies have found that students view sustainability from an enviro-centric perspective, giving little consideration to the economic and social aspects. This study redesigned a post-graduate course on sustainability to purposely attend to these three aspects, having first confirmed that these students did indeed hold such an enviro-centric view. Using interactive teaching strategies and productive pedagogies that sensitively challenged and built upon the students’ prior knowledge, students were shown how to apply systems thinking. They were also required to keep a reflective journal to record their thinking, the way it changed, and what influenced it before and after the change. A post course survey and analysis of the reflective journals demonstrated that while there were marginal increases in the students’ references to economic and social sustainability many of the students had taken on a more balanced perspective of sustainability. Significantly it was the students who had initially held the most environmentally focused views who recorded the greatest change.

Keywords
Pedagogy, higher education, student centred learning, education for sustainability

1. Introduction
The purpose of our research was to investigate students’ perceptions of sustainability and the impact of a redesigned course. The course aimed to produce graduates who have the knowledge and commitment to drive the sustainability agenda forward in their personal and professional lives. 37 students from 13 different cultural backgrounds were enrolled in the Master of Environmental Management & Sustainability program. Based on our experiences with a previous course we predicted that students who enrolled in this course would perceive sustainability as being closely aligned to the conservation of the environment and would have little appreciation of the equally important social and economic aspects of sustainability. Although there is a paucity of research reported on students’ perceptions of
sustainability, several studies have mirrored our experience. Summers et al. (2004) in a study of Oxford University students found that 87% of students documented the centrality of the environment, 69% cited economic examples, and 49% mentioned social sustainability. Only one third of the students mentioned all 3 features. Similarly Stir (2006) in a study of teacher education students at Griffith University (Australia) found that the knowledge base regarding environmental issues was minimal and insight into the social, cultural and economic complexities of ESD was quite superficial.

Based on the outcomes of these studies and our own observations, we re-designed the teaching of a course to address these enviro-centric biases. A range of constructivist based strategies for learning which emphasised a systems-based approach to thinking about sustainability was used. Developing the students’ metacognitive practices was part of the re-designed course and, as such, the students were required to keep a reflective journal to record their thinking and learning journey through the course.

A systems approach was used because it emphasises the need to understand the links between different parts of a system in order for the system to continue (be sustained). The Earth System and ecosystems were used as the conceptual starting points because we assumed that these ideas would be familiar to students attracted to this kind of program. The need to consider the links between social, economic and environmental needs in human systems, such as sustainable management of water and energy systems and approaches to climate change, was emphasised throughout the course.

2. Content and Teaching Methodology

The course was taught using an interactive, discussion-focused approach that was guided by topical readings and thought-provoking guiding questions. The twelve weekly, three hour, face-to-face sessions were theme-based and involved a variety of strategies such as pyramids (Cyrs 1994), role play, gallery walks, class debates, and group-led discussions on a topic of their choice. The first nine weeks were topic focused and involved individual groups in critiquing readings that were supported by guiding questions and which then fed into class discussions. The readings varied from book chapters to journal articles and, for some topics, newspaper articles. Most of the readings for the scientific topics such as Climate Change came from New Scientist or Scientific American because these journals present material in a form that is soundly based in science but does not require the reader to have a formal scientific background. The final three weeks of the course involved student-led, group presentations. While the emphasis of the first two sessions was on systems thinking and the reasons for using this approach, we also used these sessions to assess students’ perceptions of sustainability (Clark & Zeegers 2011).

Each year one or two of the topics (for example, Sustainable Transport) is led by an expert from another part of the university, government or industry. The use of such contemporary issues is quite powerful in challenging the way students think about sustainability because they are presented with the relevant, pertinent perspectives of leaders and practitioners in the field. Besides using current and relevant content, and a range of teaching strategies, the layout of the classroom also contributed to the interactive style of teaching. Incorporating
on-line information is an important element of the course and within the teaching space there are seven teaching pods each of which has a computer and wall mounted monitor. Students worked in small groups and were able to access the internet for specific information or use it to develop presentations. Weekly classroom discussions were usually focused on small group presentations. Role play, mini-debates and other activities that required students to consider opposing points of view were also used.

The emphasis on achieving a balanced point of view was central to the teaching focus. Each of the sessions intentionally presented information about the social and economic aspects of sustainable development as well as about the environmental aspects. For example, critiquing newspaper articles was often used to demonstrate the imbalance of media reporting of topical issues. As a case in point, the impact of a long-lasting drought on one of the most important food producing areas in Australia, the Murray-Darling Basin region in south-eastern Australia, provided a highly relevant example to demonstrate the complexity of sustainability. The basin provides a significant part of the domestic water for major cities such as Melbourne and Adelaide as well as irrigation water for agriculture. In 2008 the Australian Government commissioned a report to manage the use of the total water resource. There was much debate about how much water was needed to support the environment and the debate was polarised between farmers and environmentalists which made for good newspaper headlines but presented an unbalanced understanding to the wider community. When the report was released for comment local farming communities were quite hostile because they were more interested in the impact on local incomes and the local communities than on the environmental issues.

Analysis of the reporting in the electronic and printed media provided a stimulus for discussion amongst our students. The change in emphasis from environmental to the social and economic needs was apparent and provided a ‘real time’ example of the need to consider all three aspects when making decisions about sustainable management.

3. Determining Students’ Perceptions

To determine whether the course (and pedagogical approach) had changed the students’ perceptions of sustainability, three data collection methods were used which enabled a triangulation of the data. These methods were a pre- and post-survey; a word association exercise; and an analysis of students’ reflective journals. The analysis focused on identifying themes across the data, rather than on individual perceptions. Data were collected throughout the twelve week semester.

3.1 The survey

The survey was used as a prior knowledge activity to determine students’ pre-conceptions about sustainability. In the first session each of the students completed a survey which determined their perceptions of sustainability. The survey was repeated at the end of the course, to evaluate any change in their perceptions that may have resulted from participation in the course. Both qualitative and quantitative data were collected and compared to determine whether there was a change.
3.2 Word association exercise

Students were also asked to individually record ten words or short phrases which they associated with the term sustainability. In groups of six they shared their words or phrases, clarified their understandings of each and then collaboratively agreed on the five most important words or phrases that they believed pertained to sustainability. These words were then recorded on sticky notes and displayed on the classroom walls in alphabetical order. The class then conducted a ‘gallery walk’ in which they moved around the room looking at the range of words. This led to a robust class discussion about perceptions of sustainability and led into a presentation about energy options and a discussion about the competing economic, social and environmental aspects of nuclear energy.

3.3 Reflective journal

Students completed a weekly journal entry in which they reflected on the impact of their class related experiences, the readings, and the seminars, on their developing understanding of sustainability. Analysis of the entries focused on identifying evidence for changes in students’ thinking about sustainability in order to determine whether particular topics and/or activities were more effective than others. In the final journal entry, the students were asked to describe the most significant change (MSC) (Davies and Dart 2005) that had occurred in relation to sustainability, as a result of their participation in the course.

4. Results

The pre-course survey and the word association exercise showed that the students came to this course with an environmentally focused view of sustainability. Comparison with the post-course survey responses indicated that the students’ knowledge of sustainability and their views of such had moved towards a more balanced view. Evidence of changed perceptions was verified by the analysis of the reflective journal entries, especially the ‘most significant change’ final entry.

One of the items in the survey asked students to rank their understanding of 11 terms related to sustainability on a 5-point Likert scale. In the post survey there was an increased awareness of each of the terms, but the biggest change occurred for terms that had more of an association with the social aspects of sustainability (intergenerational equity, social capital) compared those that were related to environment (biodiversity, ecological footprint). A similar result emerged in responses to the qualitative questions, with environmentally focused responses changing from 82% at the beginning of the course to 67% at the end. What was most surprising was that 10% of the responses identified activities that demonstrated a balanced approach between the three aspects whereas no such responses were identified in the pre-course survey.

The most obvious changes were shown in students’ final entries in response to the most significant change question: “Looking back over this course, what do you think was the most significant change in your thinking about sustainability?” A typical student response was:

“Coming from an environmental conservation background the most significant change in the way that I think about sustainability is to look at the whole picture. Until this course I was focused on just the sustainable management of the environment and the social aspect
didn’t really interest me. However this course has shown me that it is important to understand and acknowledge all the different viewpoints on a subject.”

5. Summary Comment
This course took what Klosterman et al. (2012) call a problematizing approach which “focuses on the students' cognitive activity (where) the teacher's objective is to arrange things so that the students take an active part in the construction of an issue and develop a line of reasoning rather than find THE solution.” (p.82). It was the students’ final journal entries which clearly showed that the strategies and activities used during the course played an important part in developing their views about sustainability. While not all of the students had an ‘a-ha’ moment, it was evident during the class discussions that the majority had felt challenged by the views of others, be it in their groups, during whole class discussions, or by the tutor. It was the interactive nature of the course that encouraged risk taking by building upon students’ prior learning, by challenging their preconceptions and by broadening their thinking in a respectful and encouraging environment. Such an approach complements productive pedagogies research conducted by researchers such as Mills and Goos (2007), in that it purposely developed students' higher order thinking skills; it ensured that topics and themes had relevance and a ‘connectedness’ through knowledge integration; it involved activities which addressed problem-based learning, and ensured that the workshops encouraged a socially supportive environment with respect for the ideas and opinions of others. As one of the students stated in the final journal entry,

“This change was mainly caused by the interaction and exchange of ideas between the classmates who had various degrees and come from diverse backgrounds…”

It is clear from the data that it was largely through the discussions, debates and gentle challenging of ideas about what sustainability is, that the students’ views slowly developed and the concept of a balanced approach became more deeply understood. It would now be an interesting extension to the research to follow these students up to see where their realizations have taken them.

6. References


