

The Importance of Adults' Conceptions of the Environment for Education

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Abstract

Environmental education is an important strategy in achieving environmental improvement. Previously, we have analysed school children's conceptions of "environment" using a phenomenographic approach. An important qualitative difference was found between conceptions that treat the environment as an object and those that treat it as a relation. The findings reinforced other calls to locate environmental education beyond the formal school situation, using industry bodies and government departments. It seems that it may be more effective to take environmental education out of the formal school system and locate it in the community. In this paper, we report on the results of a survey of adults carried out by one such government department, the New South Wales National Parks and Wildlife Service, and describe the responses to the question "*What does the environment mean to you personally?*" Real change in thinking about the environment requires a creative approach to pedagogy, combining the conceptions of adults as well as the views of the students in their care. Environmental education needs an integration between formal and informal learning situations to effect change in people's thinking.

Introduction

It seems axiomatic that our environment is subject to an increasing range of pressures, and as a result is suffering from an increasing range of problems. While any individual problem can be defined and tackled, essential improvement requires substantial change. Environmental education is widely seen as one important strategy for achieving environmental improvement. However, despite the best efforts of a generation of environmental educators, the situation appears to be getting worse rather than better (Hicks & Bord, 2001; Connell *et al.*, 1999).

Recent reports based on surveys carried out by the Australian Bureau of Statistics point out that there seems to be a decline in concern for the environment in Australia over the last decade. In 1992, 75% of Australians stated that they were concerned about the environment, but the equivalent figure in 2001 was 62%: moreover, the drop was most pronounced in the youngest group surveyed (18–24 year olds), falling from 79% in 1992 to 57% in 2001 (ABS, 2003).

We have previously been involved in a study of Australian school children's ideas about the environment carried out in New South Wales (NSW) using a large-scale survey. The overall aim of the project was to ensure the development of more appropriate and student-centred environmental programs and curricula by a wide range of educational and environmental bodies (Walker *et al.*, 2001). Using an approach to qualitative analysis known as phenomenography, we carried out an analysis of school children's conceptions of "environment" based on their response to the statement "*I think the term/word environment means ...*" (Loughland *et al.*, 2002). We found an important qualitative difference between conceptions that treat the environment as an object and those that treat it as a relation. It would seem that a view of environment that emphasises its relationship and inter-connectedness with humankind would be a more appropriate view to aim for in

environmental education. Unfortunately, only a small proportion of students seem to hold such views (only about 1 in 8 students or 12% in our sample), while the majority consider environment as an object, a place “out there”, removed from personal considerations and essentially separated from themselves. Moreover, as students pass from primary to secondary school, the proportion holding relation conceptions seems to drop by a factor of somewhere between five and six (Loughland *et al.*, 2003). Further, knowledge of environmental issues (as measured by a series of multiple-choice questions) seems to be independent of environmental conception in secondary school, and is *negatively* correlated with relation conceptions in primary school. This is surely the wrong direction, and seems to highlight a failure of school-based environmental education programs.

In our report on the previous study (Loughland *et al.*, 2003), we suggested that it may be time to focus on other sources of environmental education. The ‘industry’ partners in that study – a museum and government departments connected with environment – all produce environmental programs for schools and all have an integrated policy on the environment. Maybe they could take a lead in environmental education. Likewise, family and other social groups are in a position to take a greater role in the education of young people about the environment. For instance, the rise of ecotourism, and an awareness of the idea that maintaining and enjoying the environment is a family-oriented leisure activity, may also lead to the development of concerned and active social groups (Welford *et al.*, 1999; Bjork, 2000). It may be more effective to take environmental education out of the formal school system and locate it in the community in which young people live. It seems that much of the research related to environmental education, and applications derived from such research, focuses on discrete problems. Recently, Environment Australia has called for tenders for the Australian Environmental Education Foundation, which aims to integrate cross-sectoral research and to adopt an holistic approach to environmental education.

In this paper, we report on the results of a survey of adults carried out by one Australian government department, the NSW National Parks and Wildlife Service. The survey was inspired by the results of the previous study of school children, and a desire to investigate the differences between the views of children in the formal schooling system and those of adults in the general community. Here we give an example of the integration of studies generated in different areas of environmental research. Such integrative studies, and their applications to community, industrial and education sectors, can help to alleviate the crises of the world today.

The Survey

The survey was commissioned in 2001 by the NSW National Parks and Wildlife Service for the purposes of investigating attitudes to and knowledge about conservation and wildlife in urban communities (Woolcott *et al.*, 2002). The survey consisted of a series of 1006 telephone interviews conducted with people aged over 18 years in NSW, Australia. The sample was selected by computer from the White Pages telephone directory (CD-ROM), stratified by location and dwelling type, age and sex, and quotas assigned for each stratum to reflect the population and situation of the NSW population in urban areas. Although the focus was on “urban” communities, this was defined in the brief as “population clusters greater than 1000 people comprising more than 250 dwellings”, and hence included 89% of the population of the state (ABS, 1998).

All respondents were asked background demographic questions and a common core of questions; then the sample was randomly divided into two, and each group was asked a different set of questions (in order to broaden the scope of the survey). Here we are concerned only with the answers to the question: “*What does the environment mean to you personally?*” which was asked of around half of the sample. The initial responses were

followed by prompting and probing questions to encourage further thoughts from the participants (such as “*Anything else?*”, “*What do you mean by that?*”, “*Are you sure that’s all?*”). A total of 495 responses were obtained, of which 59 were null or unusable, leaving 436 usable responses. These form the raw data that we have used for our analysis, carried out using the same approach as we used in our previous study of school children’s conceptions (Loughland *et al.*, 2002, 2003).

The Phenomenographic Analysis

Our theoretical framework was phenomenography, a qualitative orientation to research that looks at how people experience, understand and ascribe meaning to a specific situation or phenomenon (Marton & Booth, 1997). Phenomenography recognises that each participant’s experience is an *internal* relation between the participant and the phenomenon. However, it is the structure of the variation across the *group* that emerges through individuals’ descriptions of their experience. Phenomenography defines aspects that are critically *different* within a group involved in the same situation: it is these differences that make one way of seeing the situation qualitatively different from another.

The outcome of a phenomenographic study is a set of logically related categories – conceptions of the phenomenon. These categories and the relations between them provide the *outcome space* for the research. The categories are usually reported in order of their inclusivity and sophistication, and they are defined by their qualitative *difference* from the other categories. Thus, the categories describe the range of different ways in which the particular group involved in the study, in this case, adults in NSW, Australia, experiences the phenomenon, in this case, the environment.

Data are typically collected through a series of in-depth, open-ended interviews that focus on allowing each person to fully describe their experience of learning (Bowden, 1996). However, analysis of written materials describing the participants’ understanding of a phenomenon has often been used (Marton & Saljo, 1976; Crawford *et al.*, 1994; Keogh *et al.*, 1994), and indeed this is the approach we took in analysing the responses of school children in the previous study (Loughland *et al.*, 2002). In the present project, we were in an intermediate situation: we analysed the written transcripts of responses to questions asked in a telephone interview, both the initial question and the non-directive prompts that followed.

Results

Analysis of the comments made by a selection of adults in NSW in response to the question “*What does the environment mean to you personally?*” showed six qualitatively different conceptions of the environment. Cross reference to our previous study of young people’s conceptions of environment showed that the range and variation across the two groups is similar. It is appropriate, therefore, to maintain the established categories. Essentially, and perhaps surprisingly, adults in NSW have the same range of conceptions of the environment as school children in NSW, even those in middle primary school (year 3). The implications of this will be discussed later.

Below, we report the adults’ conceptions of environment as categories and describe the essential structure of the group’s experience. We describe each category, and illustrate each with a number of quotes from the interviews. Comparison with the quotes given in Loughland *et al.* (2002) confirms that, while the language used by some of the adult participants may be more sophisticated than that used by some school students, the conceptions of environment are essentially the same. As in the previous study, the limiting conceptions are associated with an idea that the environment is some sort of *object*, whilst the more integrated conceptions are associated with an idea that there is some sort of *relation* between people and the environment. The range of conceptions is shown in table 1.

Table 1: Adults' Conceptions of Environment

<p>Object Focus</p> <p><i>Conception 1.</i> The environment is a place.</p> <p><i>Conception 2.</i> The environment is a place that contains living things.</p> <p><i>Conception 3.</i> The environment is a place that contains living things and people.</p>
<p>Relation Focus</p> <p><i>Conception 4.</i> The environment does something for people.</p> <p><i>Conception 5.</i> People are part of the environment and are responsible for it.</p> <p><i>Conception 6.</i> People and the environment are in a mutually sustaining relationship.</p>

We have placed the categories in order, from the most limited and least sophisticated (*Conception 1*) to the most inclusive, expansive and holistic (*Conception 6*). We have also arranged them to show the most important qualitative difference between the categories: people who describe the environment using conceptions 1–3 understand it as an object, a place, possibly containing different living things, whilst people who describe the environment using conceptions 4–6 understand it from the viewpoint of a relation between various aspects. Another key component of the variation is the adults' description of an underlying ideological stance. In conceptions 1–3, the environment may be described as 'polluted' or 'clean', implying negative and positive connotations. The more integrated and expansive conceptions focus on a more dynamic and interactive model including the notion that the environment can be "safe".

In the first three conceptions the environment is experienced as an object.

In *Conception 1*, the environment is described as a place. Adults with this conception describe their understanding by using relatively short descriptions, and even when prompted, keep the focus of their description on the notion of place. Despite linguistic differences, the *meaning* of the statements indicates that these people only experience the environment in a limited or uni-structural way. Here are some examples of statements in this category (the / was used in the original transcripts to "indicate separate thoughts in the response, possibly after probing", and has been retained here):

- *Just your general surroundings*
- *Just where we live and whether it's polluted or not*
- *It's where we live / the type of things that are around us*
- *The environment is the quality of the air and the general condition of the area as a whole*
- *Like all the bush outside and stuff / bushland, just green shit*
- *Just the area around us*
- *My surroundings / where I am / the area around where I am*
- *Mainly bushland and keeping a fair bit of bush around*
- *Our surroundings / my immediate surroundings / my house to my suburbs*

In *Conception 2*, the environment is also described as a place, but a place including living things such as trees, plants or animals. This second conception is an additive conception, building on the first. Examples in this category are:

- *Well I suppose that it means the flora and fauna around you. I know that it can mean the city too, but to me it means the flora and fauna*
- *Oh God, clean air, um, plants, trees, animals, birds*
- *Grass and trees*

- *It means to me our natural environment, and in terms of our natural environment it's our biosphere, all spheres that make up our natural environment, it's to do with the land, the soil and our air and the animals that live in it / not straight out the term environment*
- *I don't know, water, the air we breath the soil around us in their natural state / trees help everything keep clean, trees and everything that grows*
- *Good habitat for native animals that can come and go as they please / without being harmed by cats and dogs / they are able to enjoy the natural fauna*
- *Oh um the surrounding area around where you live / trees / grass, water / birds / that's all that comes to mind*
- *Basically everything around you including housing, bushland, lawns, what's around you / weather and that sort of stuff / yeah, describes nearly everything that surrounds you in terms of weather changes, bushland, housing, what you actually live in*
- *Bush / everything that lives in the bush / plants and animals*

The third category, *Conception 3*, builds on and includes the first two but adds people as a component of the environment. Examples in this category are:

- *It's your surroundings, isn't it / I don't know - what is environment? It's your surroundings, isn't it? You've got a dumb one here / um, well, can the environment include people - well, I think people and society have a lot to do with the environment, and their attitude*
- *Um, it means the surroundings in which we live / I could break it down and it depends on the urban or the rural, but that is really what I understand by the term / that's a difficult one, if we're talking about general or specific, but the specific is part of the larger environment, it does include everything not just the birds and the bees, it's the neighbours and everything*
- *The plants and animals / I suppose it's the city and the people / it's everything surrounding you / no nothing*
- *The environment is the status of the animals / birds / water / soil / that you are in the centre of / the environment is the whole of nature / plants / animals / birds / soil / earth / the status of the earth*
- *Just the area around you, what's going on with the people, the plants, just the place around you*

The first three conceptions are focused on describing aspects of the environment in terms that suggest that the environment is simply “out there”. Characteristic of this object orientation is the lack of personal engagement with any issue. The next three conceptions are qualitatively different: they describe the environment in terms of a *relation* between people and the natural world.

In *Conception 4*, the characteristics of the first three conceptions are present, but the focus is on the way in which the environment can help the quality of human life. Adults who hold this conception describe dynamic interactions between the environment and people, but they couch these interactions in words that indicate that these aspects are external. They describe a one-way relation – that is, the environment in some way does something for people (such as creating a feeling of “peace”). For example:

- *The environment is sustained life / it is life sustainability / sustainability is human life, the trees are there so we can breathe, that is all I am going to say / my garden is mostly for culinary uses, herbs et cetera / diversify / I would like to have some more fruit trees / animals tend to like those, they pick at the fruit as long as there is an abundance we can live side by side.*
- *It means good health for the community both physically and psychologically and socially / an educative facility for children and adults*

- *It means the trees, the quality of clean air / the rivers / the animals in their natural habitat / really and truly a peaceful place / a place where there's not too many cars going through / a place safe for children*
- *It's a part of our life / we depend on it all of us to live / if the environment is sick so are we / we are dependent on it*
- *A pleasant surrounding where you can relax and enjoy parks and gardens and stuff / native birds and native animals / a place where you can listen to them*
- *A place where native wildlife and flora and fauna cannot be threatened / a place where I could feel safe and secure and feel at peace in*
- *Means the... I guess, the conditions of the world around me / air quality, water quality / it also means... what's the word I'm trying to say? standard of living or life, I suppose I mean that in regards to regulations / some of the stupid ones that council or environmental groups make – I think if you lose your freedom then it's not worth it / in regards to things like septic enviro-cycle things, even to the point of not allowed to chop down trees – don't get me wrong, I'm not for clearing forests but on your own block of land you should be allowed to do that, and lighting fires for instance, freedoms like that*

Conception 5 includes aspects of the previous, more limited conceptions, but it is different as the focus is on what people (or individuals) can do for the environment. In this sense, the dynamic interaction is personal. The direction of the relation is different from that shown in *Conception 4*, as the relation places the environment in a position of dependence on human care. Adults who understood the environment in terms of *Conception 5* made comments such as:

- *To keep it clean / make it healthy for the kids / bush, but not too much / native animals and wild life / leave them there / a lot of greenery*
- *Uh, it's important / I don't know uh, I don't really know how to answer your question, it means looking after our native plants and animals / in our area, it's all acreages and you can't knock down too many trees and that / um, I suppose lots of things such as clean air and trees and animals and things like that*
- *Clean air, no rubbish around, recycling, not using too many poisons, recycle where you can, not pour things down the drain / making an effort, think before you do things / I don't know*
- *Well, you've got to look after the environment and do your part, I'm not sure, you've just got to look after it, and do our best*
- *Just everybody doing their part. Doing as little or as much as they can to have a positive effect on it. Native Australia, I guess.*
- *Well, whenever I think of the environment I think of my children and what we're going to leave behind for them and I'd like to think that there'd be a decent environment left behind, we do a lot of tree planting things with the school and those sort of programs I think are very important for our children / I think that pretty much covers it 'cause it's all about trying to maintain some of our native bushland so our kids can enjoy it, recycling programs for our rubbish and things I think is the right way to go*

In *Conception 6*, the dynamic view of the environment described in *Conceptions 4* and *5* is expanded through a focus in the integration of the systems. In this conception, people and the environment are described as being in a mutually sustaining relationship. In some instances, the adults surveyed refer to cultural philosophies that inform the way in which we care for the environment. Examples of this are:

- *Um, keeping um everything clean and tidy and don't leave everything lying around and look after what you got, look after what's around you and don't leave anything uncared for or damaged, and getting recyclable bins in my area would do for starts / not really, no*

/ Um it's hard, ah I just like environment, all I care about is that it is a safe and tidy place where I can take my kids to play and I know that it will be a safe and tidy place and I don't have to worry about anything

- *It means keeping it clean, lots of wildlife, being able to enjoy the wildlife and natural flora and fauna / I think it should be kept clean for future generations to come so they can enjoy / it'd be nice just to have things for kids to see in the future, that's about all / to have wildlife areas where people could enjoy and so people can see animals in their natural habitats*
- *Um, environment is really important for to look after our planet so it lasts and to maintain what we have for the next generation / our resources like water and where we grow or food*
- *Balanced management of built up areas / quality of life / balanced development of residential areas / where nature is preserved in places / look after it yourself rather than let it slash and burn*
- *Natural, unspoilt, relaxful, precious / unreplaceable, it won't come back if you destroy it, must be maintained for future generations*
- *Keeping with nature and keeping in within the area you live in / keeping trees and animals under control looking out on how to help the environment with cutting out the pollution and then we can live in a better society because the environment around our lives is healthier*
- *Just everything working together in harmony / I guess how it was created in the first place – natural, with man carefully treading his way through*

The six conceptions are hierarchical, in that adults who experience 'environment' at the broader and more holistic conceptions are able to include elements of the narrower and more limited conceptions within their views. This is obvious in the additive structure of the first three conceptions, but also extends to the second group of three. A person who holds a dynamic view of the environment as being in a mutually sustaining relationship with humankind (*Conception 6*) is also aware of looking after (*Conception 5*) and being nurtured by the environment (*Conception 4*), and will also be able to talk about the environment as a place (*Conception 1*) that includes living things (*Conception 2*) and people (*Conception 3*). The opposite does not hold, however. A person whose essential view of environment is that of a place (*Conception 1*) will find it very difficult to conceive of any of the relation conceptions, even with prompting.

Following the phenomenographic analysis that focused on variation in the meaning of the responses across the whole sample, we returned to the individual responses and classified each one into one of the conceptions. Table 2 shows the distribution of conceptions within our sample: of the 436 usable responses, the majority (249 or 57%) were identified with the object conceptions, and somewhat less than half (187 or 43%) were identified with the relation conceptions of environment.

Table 2: Frequencies of Conceptions of Environment

<i>Phenomenographic conception</i>		<i>All responses</i>		<i>Usable responses</i>	
		<i>number</i>	<i>%</i>	<i>number</i>	<i>%</i>
0	<i>Unusable/missing</i>	59	11.9		
1	Object	131	26.5	249	57.1
2		100	20.2		
3		18	3.6		
4	Relation	59	11.9	187	42.9
5		91	18.4		
6		37	7.5		
Totals		495		436	

Discussion

The conceptions identified in this study with adult respondents are fundamentally the same as those identified in the previous study with schoolchildren. It may seem surprising that adults have the same range of views about “environment” as children in secondary and even primary schools. This indicates that while people may develop the sophistication of their ideas about the environment as they progress through school and pass into adulthood, they do not easily change their essential conceptions of the phenomenon. There is an assumption that change will occur automatically as a person gets older and becomes more mature. However, this seems not to be the case in terms of people’s conceptions. The intersection of these two research studies suggests that people need to be confronted with their environmental conceptions, and the range of other possible ways of seeing the environment, before they can shift from one way of thinking to another. Our previous research in statistics (Reid & Petocz, 2002) has shown that people can and do change their thinking when they become aware of the range of variation in conceptions of a phenomenon. This change in thinking is then related to changes in approach and actions as their perceptions of the situation demand. Ballantyne and Packer (1996) state that “*learning does not always require a radical change in conceptions*”: however, our findings suggest that in the case of environmental education such a radical change in conceptions would be necessary to overcome the persistence of an object conception of environment, and the environmental behaviour that would seem to go with it.

In the previous study of school children, we found that 88% of 1734 usable responses were classified as object focus, and only 12% as relation focus. There are more adults that have described the environment with a relation focus and we suspect that this may be due to the somewhat different question that was asked between the two groups, and the situation within which it was asked. The young people were asked to complete the sentence “*I think the term/word environment means ...*” within a written-response format, and in an institutional context where they are used to having to give a short and correct “answer” (and particularly a more “scientific” answer or definition in the secondary school). The adults, on the other hand, were asked “*What does the environment mean to you personally?*” within a telephone interview. Their responses were followed by further questions, giving them the opportunity to amplify the meaning. Despite leading the adults to make a personal response, the majority of the responses were still within the object focus range.

As an aside, the findings from our analysis of this survey question appear to validate the phenomenographic method employed in our previous study on children’s perceptions of environment (Loughland *et al.*, 2002, 2003). This suggests that the phenomenographic

method might be one way of overcoming the reductionism that may occur when such data are approached with *a priori* definitions. In the present study, we are confident that the categories were obtained from the analysis of the text itself. Indeed, we expected to see different categories emerge from this set of data from adults and were surprised to see confluence in the categorisation of the data with our earlier study of school children.

What do these results mean for environmental education, in the broadest sense? Firstly, it seems reasonable to regard the 'relation' conceptions – the broadest and most holistic conceptions – as the more desirable outcomes, not only because they engage people with their relationship with their environment, but also because they represent the highest levels in the hierarchy, allowing people access to the full range of conceptions of environment. In maintaining this view, we are not trying to set up an artificial dualism, such as the theory/practice, nature/society and content/context divides that have been discussed in the modernist context by Latour (1999, p. 294). Indeed, we have identified *six* qualitatively different conceptions of environment: it is only at the coarsest level that we separate these notions into 'object' and 'relation', and the hierarchical nature of these implies that the 'relation' view includes the 'object' view.

If we agree that we should aim for the 'relation' conceptions, then it seems apparent that environmental education should be directed community wide, at adults as well as children, in informal situations as well as in formal schooling. In all three groups that we have looked at (primary school, secondary school and adults), the majority of people indicated that they held 'object' views of the environment, even when the context and questions tried to push them towards a personal connection. Thus, there is plenty of room for environmental education to have an impact on people's thinking. Moreover, our previous research (and others', for example, Hicks and Bord, 2001) suggests that such education needs to go beyond the purely factual and descriptive, and challenge people's thinking about their attitudes towards environment. There is evidence from other fields that such an approach is able to effect conceptual change (for example, Ho *et al.*, 2001, in academic staff development) and can be used as the basis for a conceptual change approach to curriculum (Reid & Davies, 2002, in design education).

There seems to be a complex relationship between adults and children in terms of learning about the environment. Not surprisingly, children report that adults (parents, family, teachers) are important sources of information about the environment (Walker *et al.*, 2001), and this connection has been investigated in Australia as a resource for more effective environmental education (for example, Ballantyne *et al.*, 1998, 2001; NSW Department of Education and Training, 2001). Some experience in other countries indicates that this can prove ineffective if appropriate curriculum support is lacking (for example, Chatzifotiou, 2002, in the UK).

A particularly important group of adults in the context of environmental education is school teachers, and appropriate professional development could be particularly effective with teachers, especially those in secondary schools. There is a body of environmental education research (for instance, Stables, 2001; Fien *et al.*, 2001) which suggests that the answer to more effective environmental education is an integrated curriculum that cuts across disciplines. This strategy has been recommended for some years without any obvious changes in the secondary system. Other strategies that will accomplish the same end need to be explored, but they will have to contend with the present focus on factual material and concrete outcomes (high marks) in discrete subjects, aims that are often in conflict with the holistic notions that the broadest conceptions of environment require. As Hicks and Bord (2001, p.423) conclude: "*It is our contention, therefore, that many educators, despite their commitment to global understanding, may make things worse for students by teaching about global issues as if this were solely a cognitive endeavour. At the very least this and other fields relating to the human condition have cognitive, affective and existential dimensions.*"

University students are another important group for environmental education, as they will form the next generation of professionals. Their teachers, university lecturers, need to integrate environmental education as a component of sustainable development within course units. Most tertiary institutions have a stated policy of developing “graduate attributes” or “generic skills” (usually including notions of sustainability): the reality is that development of these attributes often depends on individual academics, who may hold narrow conceptions of such ideas as sustainability or environment, and may not even see where they could be included in their courses. Professional development can be used to help them develop appropriate strategies for embedding the notion of sustainability within their own curriculum: a project funded by Environment Australia and Macquarie University, Sydney (Tilbury and Reid, 2002) is addressing this at present.

Although we have focused on specific groups in the previous paragraphs, our results suggest that environment education needs to engage the whole community, including students and teachers at all levels. Real change in thinking about the environment requires a creative approach to pedagogy, combining the conceptions of adults as well as the views of the students in their care. In terms of range of conceptions, there seems to be little difference between the general adult community and students in year 3 of primary school. An important dimension of the engagement is an examination of people’s conceptions of environment rather than the traditional focus on environmental knowledge and facts. Government and community bodies can play an important part in such a program. The survey reported in this paper, conducted by the NSW National Parks and Wildlife Service, is one example: the results can be an important source for informing the environmental education programs carried out by the NPWS and other government and industry groups. In this way, environmental education can integrate formal and informal learning situations to effect change in people’s thinking.

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References

- Australian Bureau of Statistics (1998). *Australia Now – Australian Social Trends 1998. Population distribution: small towns*. On-line at <http://www.abs.gov.au> .
- Australian Bureau of Statistics (2003). *Year Book Australia 2003*. On-line at <http://www.abs.gov.au> .
- Ballantyne, R., Connell, S. and Fien, J. (1998). Factors contributing to intergenerational communication regarding environmental programs: preliminary research findings. *Australian Journal of Environmental Education*, 14, 1–10.
- Ballantyne, R., Fien, J. and Packer, J. (2001). School environmental education program impacts upon family learning: a case study analysis. *Environmental Education Research*, 7(1), 22–37.
- Ballantyne, R. and Packer, J. (1996). Teaching and Learning in Environmental Education: Developing environmental conceptions. *Journal of Environmental Education*, 27(2), 25–33.
- Bjork, P. (2000). Ecotourism from a conceptual perspective, an extended definition of a unique tourism form. *International Journal of Tourism Research*, 2, 189–202.
- Bowden, J. (1996). Phenomenographic research – some methodological issues. In Dall’Alba, G. and Hasselgren, B. (eds.), *Reflections on Phenomenography*. Goteborg Studies in Educational Sciences, 109, 49–66.

- Chatzifotiou, A. (2002). An imperfect match? The structure of the National Curriculum and education for sustainable development. *The Curriculum Journal*, 13(3), 289–301.
- Connell, S., Fien, J., Lee, J., Sykes, H. and Yencken, D. (1999). 'If it doesn't directly affect you, you don't think about it': a qualitative study of young people's environmental attitudes in two Australian cities. *Environmental Education Research*, 5(1), 95–113.
- Crawford, K., Gordon, S., Nicholas, J. and Prosser, M. (1994). Conceptions of mathematics and how it is learned: the perspectives of students entering university. *Learning and Instruction*, 4, 331–345.
- Fien, J., Scott, W. and Tilbury, D. (2001). Education and conservation: lessons from an evaluation. *Environmental Education Research*, 7(4), 379–395.
- Hicks, D. and Bord, A. (2001). Learning about global issues: why most educators only make things worse. *Environmental Education Research*, 7(4), 413–425.
- Ho, A., Watkins, D. and Kelly, M. (2001). The conceptual change approach to improving teaching and learning: an evaluation of a Hong Kong staff development programme. *Higher Education*, 42, 143–169.
- Keogh, J., Cook, A. and Bruce, C. (1994). Science students' and science teachers' conceptions of learning. In Ballantyne, R. and Bruce, C. (eds.), *Phenomenography: Philosophy and Practice*. QUT Publications, Brisbane.
- Latour, B. (1999). *Pandora's Hope: Essays on the Reality of Science Studies*. Harvard University Press, Cambridge, MA.
- Loughland, T., Reid, A. and Petocz, P. (2002). Young people's conceptions of environment: a phenomenographic analysis. *Environmental Education Research*, 8(2), 187–197.
- Loughland, T., Reid, A., Walker, K. and Petocz, P. (2003). Factors influencing young people's conceptions of environment. *Environmental Education Research*, 9(1), 3–19.
- Marton, F. and Booth, S. (1997). *Learning and Awareness*. Lawrence Erlbaum, New Jersey.
- Marton, F. and Saljo, R. (1976). On qualitative differences in learning: 1 – outcome and process. *British Journal of Educational Psychology*. 46, 4–11.
- NSW Department of Education and Training (2001). *Environmental Education Policy for Schools*. Curriculum Support Directorate, Sydney.
- Reid, A. and Davies, A. (2002). Teachers' and students' conceptions of the professional world. Presented at *Improving Student Learning Conference*, Brussels, September.
- Reid, A. and Petocz, P. (2002). Learning about statistics and statistics learning. *Australian Association for Research in Education 2002 Conference Papers*. Compiled by Jeffrey, P. L., AARE, Melbourne. Online at <http://www.aare.edu.au/index.htm> .
- Stables, A. (2001). Who drew the sky? Conflicting assumptions in environmental education. *Educational Philosophy and Theory*, 33(2), 245–256.
- Tilbury, D. and Reid, A. (2002). *Action Research for University Staff: Change in Curricula and Graduate Skills Towards Sustainability (ACTS)*. Environment Australia and Macquarie University collaborative research grant.
- Walker, K., Loughland, T., Brady, L., Petocz, P. and Reid, A. (2001). What do children think about the environment and where do their ideas come from? A study of the socio-cultural influences on environmental understandings of Australian schoolchildren. Paper presented at the *American Educational Research Association Annual Conference*, Seattle, April.
- Welford, R., Ytterhus, B. and Eligh, J. (1999). Tourism and sustainable development: an analysis of policy and guidelines for managing provision and consumption. *Sustainable Development*, 7, 165–177.
- Woolcott, I., Wong, K. and Verschoor, D. (2002). *Urban Wildlife Renewal "Growing Conservation in Urban Communities"*. NSW National Parks and Wildlife Service Special Research Report.