Australian Journal of Environmental Education, vol. 30(1), 78–87, 2014

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Young People and the Environment in Australia: Beliefs, Knowledge, Commitment and Educational Implications

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A B S T R A C T

There is a paucity of research in Australia on the nature of young people's attitudes, knowledge and actions. This paper reports on the findings from one such study of Australian high school students. The research was based on a survey of 5 688 students from Melbourne and Brisbane. These young people identified protection of the environment as the most important problem in Australia and strongly supported the belief systems characteristic of an 'environmental paradigm'. Despite this, the majority displayed relatively low levels of knowledge of key environmental concepts, and were involved in little environmental action-taking outside of household activities. Differences are reported between: students from Melbourne and Brisbane; girls and boys; high performing and general schools; and teachers and students. The paper concludes with a discussion of some implications for environmental education in Australia.

Surveys of environmental attitudes are now becoming commonplace. For example, many surveys have been commissioned by Federal and State Governments in Australia while pollsters regularly include environmental attitude questions in their opinion polls (ANOP 1993). The Australian Bureau of Statistics has begun a series of environmental attitudes surveys which, although asking a limited number of questions, is repeating the same questions in each survey in order to monitor changes in attitudes over time (Australian Bureau of Statistics 1992, 1994, 1996 & 1998). Despite these initiatives only a handful of studies have examined the environmental attitudes of school-age Australians. Spanning several decades these include the observation and interview based study of young people's attitudes to the urban environment in Melbourne reported in Lynch's ground-breaking *Growing up in Cities* (Lynch 1977), and the recent survey based studies by Clarke (1996) and Hampel, Holdsworth and Boldero (1996). Unfortunately there have been no replications of these studies apart from Karen Malone's current participation in a contemporary review of the Lynch research (Malone 1998). Similarly, no studies have sought to relate their findings to those of similar previous studies, and there has been little work comparing Australian findings between its cities or states, or with similar work overseas. Thus, there is little of an accumulated research base for studies of youth environmental attitudes in Australia.

The research reported in this article constitutes the first stage of a large longitudinal and cross-cultural study of the environmental attitudes of young people in the Asia-Pacific region. The full project involves cultural studies, surveys and focus group research on the attitudes of 16–17 year old students in Australia as well as in Brunei, Fiji, Hong Kong and South China, India, Indonesia, Japan, Papua New Guinea, the Philippines, New Zealand, Singapore, Taiwan, Thailand, South Korea and the United States of America. The part of the study reported in this article presents the findings from the Australian survey research. A report on the Australian focus group study can be found in Connell, Fien, Lee, Sykes and Yencken (1998); the results of the international study will be published by the UNESCO Asia-Pacific Centre of Educational Innovation for Development in 1999.

Profile of participants

The surveys were conducted in Melbourne and Brisbane with two samples of students from each city. One sample, called 'high performing schools' in this report, contained secondary schools of very high academic achievement; they were ranked by tertiary entrance authorities as educating the greatest percentage of students who achieved the highest tertiary entrance scores in their states. The second sample was representative of all secondary schools in each city. Both samples of schools were randomly generated and the full-year population of 16–17 year olds in each school were surveyed. The two samples provided an opportunity to obtain information about, and to identify any significant differences between, the reported attitudes, knowledge, sources of knowledge and actions of students in all schools, and of students in high performing schools. The decision to obtain data from a sample of students in

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high performing schools was a result of the nature of the samples used in the wider international study where researchers in each country focused on samples of high achieving schools for purposes of international reporting. This was done in order to limit the influence of different retention rates and school leaving ages for students in the Asia-Pacific region on the nature of the samples.

The total sample in this study was 5 688 students from 52 secondary schools. The vast majority of students were aged 16 years and were in their second to last year of high school. Table 1 shows the distribution of the sample between Melbourne and Brisbane, between general and high performing schools and between the three main kinds of schools in Australia. The sampling of schools in each city and category was structured to account for gender and school size also. 57% of the respondents were girls and 43% were boys. Year 11 teachers in all the schools were also asked to complete surveys; 225 responses were received in Melbourne and 146 in Brisbane (n=361). These were treated as a single sample because this number was relatively small compared to the student samples.

Table 1: The survey sample—students

School type	Number			Percentage*		
	All	Brisb.	Melb.	All	Brisb.	Melb.
General sample						
Government	1,990	948	1,042	35	33	37
Catholic	912	389	523	16	14	19
Independent	686	445	241	12	16	9
Subtotal for general sample	3,588	1,782	1,806	63	62	64
High performing sample	2,100	1,088	1,012	37	38	36
Total sample	5,688	2,870	2,818	100	100	100

* All percentages in all tables are rounded to the nearest whole number. Invalid or missing responses are not included.

The design of the questionnaire was based upon a detailed review of the literature. After being trialed in three Melbourne and three Brisbane schools, and discussed with the international collaborators, it was revised before being adopted. The questionnaires, which took approximately 30 minutes to complete, were completed either in English or pastoral care classes in order to involve the whole 16–17 year old cohort of students in each school.

The design of the survey instrument

The questionnaire investigated eight main areas. Students were asked to:

- indicate their perceptions of (i) the relationship between the environment and the economy and (ii) and the mix of strategies required for improving the environment. Multiple choice questions were used.
- rank the degree of importance of (i) a set of societal issues for Australia and (ii) a set of environmental issues for the world and for Australia.
- indicate on a five point scale the extent to which they agreed with a series of statements representative of the 'technological' and/or 'new environmental' paradigms. A set of twelve pairs of statements were used, adapted from scales developed and tested by Olsen, Lodwick and Dunlap (1992). Responses were scored from -2 (a 'strong technological orientation') to +2 (a 'strong environmental orientation') on each pair, thus producing a range of total scores from -24 to +24 respectively.
- indicate their degree of familiarity with, and then to define, a set of key environmental concepts selected from across environmentally-related syllabuses in Australia as well as national environmental policy statements. The concepts were: renewable resources, ecology, greenhouse, ozone layer, carbon cycle, sustainable development, carrying capacity, biodiversity, intergenerational equity, and precautionary principle. Students were asked an initial question to find out whether they had ever heard of these concepts and, if so, whether they had discussed them either at school and/or at home. Multiple choice questions were used to test whether students could define the concepts correctly.
- indicate personal commitment to the environment and past environmental actions. This included questions about patterns of student involvement in environmentally protective actions, for example willingness to be involved, self-rating of action skills, and regularity of participation in such actions. Likert scales were used to obtain information on students' explanations of these patterns in terms of their perceptions of the degree of satisfaction they felt and the level of support they received from friends and family. They were also asked to indicate any factors that prevented them from doing more for the environment than they are already doing.
- rank the importance and perceived reliability of a set of possible sources of environmental information.
- indicate how frequently they discussed environmental issues outside of school, and their views about the desirability of more frequent discussions in school.

The summary and analysis of patterns of responses to these questions are reported first in terms of amalgamated students responses, and then with reference to differences between the following sub-groups in the total sample: Melbourne and Brisbane students; girls and boys; students from the general and the high performing school samples; and students and teachers.

Student responses

Environment, economy and strategies necessary for sustainability

Consistent with the findings of adult opinion polls in Australia (eg ANOP 1993) a clear majority (68%) of young people considered that it was important to protect the environment, even if it meant some reduction in economic

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growth. When asked if they thought economic growth was bound to be at the expense of the environment a larger majority (75%) stated that they believed it was possible to have both a prosperous economy and a healthy environment. Table 2 shows that close to half of the students believe that a broad mix of government legislation and regulation, personal lifestyle changes and communities working together would be necessary to achieve this balance and to protect the environment. The response 'communities working together' was the most commonly chosen strategy while 'a radical restructuring of society' was the least common.

Table 2: Student opinion about strategies necessary for sustainability

Strategy	% of students*
Government legislation & regulation	39
Personal lifestyle change	49
Communities working together	60
A radical restructuring of society	18

* Students were able to choose as many strategies as they thought appropriate.

Societal goals for Australia and the world

From an extensive list of societal goals the students chose the following five as the most important for Australia today: protecting the environment - 23%; preventing war and nuclear threats - 22%; creating a fairer and more humane society - 14%; reducing unemployment - 11%; strengthening the economy - 5%.

Other Australian (Yencken 1992, 'Job scarcity' 1997) and overseas research (Fuller 1992, NEETF 1994) has made similar findings. However, the view that unemployment and the economy are the most important issues has been reported in other studies of the opinions of young people (Steele 1989) and of adults (ANOP 1993, Lothian 1994, Keys Young 1994).

Students in both cities identified the destruction of the ozone layer and the cutting down of forests as the two most important issues environmental issues facing Australia—see Table 3. Water pollution, soil erosion and land degradation, household rubbish and garbage, and air pollution were ranked nearly equally as the next most important issues.

Table 3: Student opinion about the most important environmental issues facing Australia

Issue	% of students
Destruction of the ozone layer	17
Cutting down of the forests	16
Water pollution	13
Endangered animals and plants	10
Soil erosion & land degradation	10
Household rubbish	8
Air pollution	7

In contrast, a recent Australian Bureau of Statistics study of adults indicated that adults considered air and water pollution and, to a lesser extent, forest clearance as the most important environmental issues in Australia (ABS 1996). In the present study, student perceptions of environmental problems were thus somewhat different from those of the adult Australian population. By way of contrast the main conclusion of scientists who contributed to the 1996 State of the Environment report (State of the Environment Advisory Council 1996) was that the most significant environmental problems in Australia relate to loss of biodiversity and degradation of soils and inland waters.

As shown in Table 4 destruction of the ozone layer was clearly ranked by students as the most important global environmental issue. Over-population and the cutting down of forests were identified as the next most important issues. While no comparable Australian data exists, overseas research has found a much higher level of concern in young people about air pollution as a global problem (Blum 1987, Gayford 1987, Leal Filho 1996).

Table 4: Student opinion about the most important environmental issues facing the world

Issue	% of students
Destruction of ozone layer	26
Overpopulation	16
Cutting down of the forests	15
The greenhouse effect	9
Water pollution	8
Air pollution	6
Endangered animals and plants	6

Belief in a technological or environmental paradigm

To measure the degree to which the respondents' beliefs were more strongly oriented to a technological paradigm, or an environmental paradigm, students were asked to respond to twelve pairs of opposing statements along a five point scale.

The results in Table 5 show that few students had a technological or strongly technological orientation. By contrast, 61% of all students held beliefs consistent with an environmental orientation and a further 21% had a strongly environmental orientation. These findings are consistent with those of Olsen et al (1992) whose research with adults in the United States has indicated a significant shift away from the belief that science and technology could solve all environmental problems towards much more cautious and qualified views about science and technology and a growing belief in the need to respect the environment. The present Australian student findings show an even stronger affiliation with an environmental orientation than that recorded in the surveys carried out by Olsen et al with adult groups.

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Table 5: Percentage of students expressing a technological or an environmental orientation in their beliefs

Orientation	All	Melbourne	Brisbane
Strong technological (scores of -24 to –13)	0	0	0
Technological (scores of -12 to –1)	9	10	7
Neutral (score of 0)	3	4	3
Environmental (Scores of +1 to +12)	61	62	61
Strong environmental (scores of +13 to +24)	21	18	24

Note: Columns do not add up to 100% as a small percentage of students did not complete all items in this set of questions.

'The most pro-environmental response.....was in relation to the item 'people should adapt to the environment whenever possible"

The most pro-environmental response of the students (61%) was in relation to the item 'people should adapt to the environment whenever possible'. By contrast the strongest pro-science and technology response was to the statement that 'science and technology have improved our quality of life'—63% of students stated that they agreed or strongly agreed with this view. The most popular response to several items was a neutral position suggesting the students were undecided about statements such as: 'complex technologies will always be able to find solutions to our problems" - 40%; 'complex technologies will always be risky because of the chance of human error' - 37%; 'modern technology has reduced our freedom and independence' - 37%; 'economic growth should be given priority over environmental protection' - 34%; 'nature should be used to produce goods for people' - 31%, and 'because we are human we are not subject to the same laws of nature as other species' - 30%.

These findings appear to show relatively strong support for an environmental paradigm, but a sense of indecision about the importance of technology and economic growth at the expense of environmental protection.

Environmental knowledge

Students were asked ten questions to assess their awareness and knowledge of key environmental concepts. A decision was made to focus on conceptual rather than factual knowledge in order to gain an appreciation of the deeper levels of thinking and knowledge of students.

Table 6 shows that awareness of these concepts ranged from moderate (for renewable resources, ecology, greenhouse and the ozone layer) to low (for intergenerational equity and the precautionary principle), the concepts of biodiversity and sustainable development being familiar to less than half of the students. Students who were aware of the concepts were then asked if these had been discussed at school or at home. Whereas greenhouse and the ozone layer had been widely discussed at school and half of the students reported discussing them at home, less than 5% reported any discussion of the precautionary principle and intergenerational equity at either site. Little discussion of the concepts of biodiversity, sustainable development, carbon cycle and carrying capacity was reported at school while only 50% of the students reported that they had discussed ecology or renewable resources at school. Less than 10% of the students reported that they had ever discussed seven or more of the ten concepts at home.

Table 6: Percentage of students who stated that they were aware of key environmental concepts and who could correctly define them

Concept	Awareness			Knowledge		
	All	Melb.	Brisb.	All	Melb.	Brisb.
Renewable resources	53	54	50	52	46	59
Ecology	53	55	51	48	35	58
Greenhouse	45	44	46	67	63	70
Ozone layer	44	43	45	39	38	40
Carbon cycle	46	44	49	42	36	48
Sustainable development	42	40	64	23	20	25
Carrying capacity	39	37	40	75	71	79
Biodiversity	36	34.	38	78	76	80
Intergenerational equity	27	24	30	60	58	62
Precautionary principle	18	18	18	19	17	20

Students' ability to define the concepts accurately was also not strong. The average score for all students was 5, out of a maximum score of10. The overall results, presented in Table 7, were generally consistent with other measures of adolescent environmental knowledge (Blum 1987, Hausbeck, Milbrath & Enright 1992, Clarke 1996, Gambro & Swizky 1996, Hampel et al 1996).

Table 7: Percentage of students able to define ten key environmental concepts correctly

Environmental knowledge scores*	All	Melbourne	Brisbane
0 to 2 correct	17	21	12
3 to 5 correct	45	49	41
6 to 8 correct	35	27	42
9 to 10 correct		4	36

* Columns may not total 100% due to rounding of percentages.

Only two concepts, biodiversity and carrying capacity, were defined correctly by more than 75% of the entire sample—see Table 6. The three concepts students had most difficulty defining correctly were ecology, sustainable development and ozone layer while almost half of the

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students stated they were 'unsure' of the definitions of sustainable development, the precautionary principle and the carbon cycle.

Table 6 also suggests that some discrepancies exist between levels of awareness and knowledge of certain concepts. For example, between 60 and 75% of students were able to correctly define carrying capacity, biodiversity and intergenerational equity although less than half of the students stated that they were aware of the concepts of carrying capacity and biodiversity and less than a third of intergenerational equity. This suggests that the correct answers to these questions might have been easy to guess or to reason from the alternative possible answers. A majority of students were both unfamiliar with and unsure of the meanings of the concepts of ozone layer, ecology, renewable resources, the precautionary principle and the carbon cycle. However, 49% of students said that they were aware of sustainable development, but only 25% could correctly identify the best answer from four alternatives; this was the standard definition in the Brundtland Report and the Australian National Strategy for Sustainable Development related to using resources in such a way as to enable future generations to satisfy their reasonable needs.

Desire to be involved in, and perceived skills related to, environmental action

'students rated somewhat lower their skills and knowledge to help bring about even small environmental improvements'

The next set of questions related to the students' reported involvement in environmental action-taking. A majority of the students (68%) expressed a 'medium' to 'strong' desire to be involved in actions to improve environmental quality. A further 21% of the students characterised their desire as 'very strong'. However, the students rated somewhat lower their skills and knowledge to help bring about even small environmental improvements, with 64% rating their action knowledge and skills as 'moderate', 'low' or 'very low'.

Given the students' relatively low assessment of their action knowledge and skills it was not surprising that they were almost evenly divided about whether they had ever taken any deliberate action to improve the environment, with 55% stating they had and 40% stating they had not. When asked, if they had taken any actions which ones from a list of twenty these had been, the average participation score for each student was twelve. The four most commonly reported actions were: decided to reuse or recycle rather than throw away—71%; chose household products better for the environment—59%; made an effort to reduce water consumption—43%; encouraged some one else to change an action or practice—38%.

Less commonly reported actions included: information-gathering exercises—'tried to get environmental information for their own interest'; political activities—'written a letter or signed a petition' and 'made a report or complaint about an environmental issue'; community oriented actions—'taken part in a clean-up or anti-litter campaign' and 'taken part in a tree-planting program'; and financial actions—'made a gift or donation'. Just under a quarter of all students reported that they had never carried out any of the listed actions. Only approximately half of the students stated that they would consider doing any of the listed actions in the future.

When those who had taken a deliberate action to improve the environment were asked how they felt afterwards, more than half (56%) stated that they 'felt positive about the experience' while a further 24% reported feeling 'really good and motivated to do more'. Only 18% said that they felt 'only OK about it'.

'The highest level of antagonism or indifference reported was from close friends .....and teachers.....'

Students were then asked whether, when taking deliberate actions to improve the environment, they had been fully supported, given some support, or had met with indifference or antagonism from family, close friends, other friends, others involved and teachers. The highest level of full support reported was from others involved (59%) and their immediate families (46%). The highest level of antagonism or indifference reported was from close friends (40%) and teachers (32%).

When asked about reasons for any reluctance they might feel in undertaking deliberate action for the environment, the most commonly reported responses were: 'I feel that there is no practical alternative'—44%; 'I don't think my actions will make much difference'—44%; 'I don't have time'—35%; 'I don't understand what is harmful and what is not'—33%; 'Cost: I am more concerned with saving money'—30%; 'It's more convenient not to be worrying about the environment'—28%.

The variety of justifications for inaction with which more than a third of students agreed suggests some avenues for environmental educators to pursue. These are highlighted in the conclusion.

Importance and reliability of sources of environmental information

As indicated in Table 8 television and school were identified as the most important sources of environmental information. This is consistent with past research with American young people (NEEFT 1994, Hausbeck et al 1992). Government, friends and business were, by contrast, not perceived as important sources of information, with less than 5% of students nominating them. However, these rankings changed considerably when the students were asked about the reliability of the information they obtained from different sources. Schools and NGOs were regarded as the most reliable, with the media being rated only of moderate reliability.

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Table 8: Importance and reliability of sources of environmental information

Sources of information*	"Most important" % of students	"Very reliable" % of students
TV	45	23
School	43	31
Newspapers	33	23
Environmental NGOs	20	41
Family	13	13
Radio	8	10

* Students were able to nominate two sources

Discussions in and out of school

The last two questions sought to ascertain to what extent environmental issues had been discussed in and out of school. Surprisingly, only 7% of the students stated that they regularly talked about the environment while a further 20% reported discussing the environment only about once a month. The most common response of students (49%) was that they talked about the environment outside of school only several times a year while 19% stated that they had never been discussed it with their friends outside of school.

However, accompanying these low frequencies of discussion there was quite strong student support for increased attention to environmental issues in the classroom—see Table 9. Almost half the students indicated they would like to discuss the environment in school at least once a month or even once a week.

Table 9: Desired frequency of environmental discussions in school

Frequency of discussion	%of students
Never	6
Sometimes (several times a year)	36
Often (at least once a month)	36
Regularly (once a week)	18
No response	4

Differences between sub-groups in the sample

Melbourne and Brisbane students

A number of clear differences existed between the responses of students in Melbourne and Brisbane. In terms of support for an environmental paradigm Brisbane students had much stronger environmental beliefs than Melbourne students (t=6.88, p<.000). Brisbane students also had a higher overall level of familiarity with environmental concepts (t=2.86, p<.01) and showed a greater ability to define environmental concepts correctly than Melbourne students (t=14.28, p<.000). Additionally, they expressed a stronger desire to be involved in helping the environment (t=3.31, p<.001) and their perception of their abilities to take environmental action was higher (t=2.55, p<.01), perhaps because they had, on average, undertaken more personal environmental actions than the Melbourne students (t=8.51, p<.000).

Not surprisingly, given the greater level of environmental action-taking by Brisbane students, fewer reported lack of interest as a major reason for not taking more pro-environment actions (χ^2=9.37, p<.01). More Melbourne than Brisbane students reported believing that their actions would not make a difference, although this difference was not statistically significant (χ^2=3.41, ns). More Brisbane than Melbourne students reported that their reasons for not taking some of the listed environmental actions included not having any practical alternative (χ^2=9.19, p<.01) and not understanding what was harmful (χ^2=3.87, p<.05). Although Brisbane students reported receiving greater support from others involved (χ^2=5.47, p<.01), more Melbourne students report receiving full support from teachers (χ^2=14.77, p=<.000).

'Brisbane students consistently displayed higher levels of environmental beliefs, awareness, knowledge and reported actions'

These data indicate that Brisbane students consistently displayed higher levels of environmental beliefs, awareness, knowledge and reported actions than Melbourne students. An intriguing question then is whether this pattern is best explained by differences in perceived environmental problems in the two cities or regions, by better media coverage of environmental issues in Brisbane, or by other influences including differences in environmental education in the two school systems.

Students from both cities shared similar beliefs about the most important environmental problems facing Australia. Despite this similarity the students from Melbourne and Brisbane differed in their views about the most important societal issue in Australia. More Melbourne students identified protecting the environment (χ^2=16.21, p<.000), but more Brisbane students identified creating a fairer and more humane society (χ^2=8.41, p<.01). The students also differed in their perspectives about the best set of strategies to bring about environmental improvements. While students in both cities saw personal lifestyle change as necessary, more Brisbane students regarded government regulation and legislation as also necessary (χ^2=39.44, p<.000), whereas more Melbourne students regarded communities working together as necessary (χ^2=25.54, p<.000).

The Brisbane students' reporting of stronger support for an environmental paradigm may be because environmental problems were more generally seen as important by Queenslanders. It might be argued that there have been high levels of concern in Queensland about increasing suburbanisation, rapid and insensitive coastal development, and a general but long history of less effective environmental controls than within Victoria and the consequently more extensive environmental damage in Queensland. Indeed, many of Australia's more significant recent environmental battles have been fought in

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Queensland. These have included: possible oil drilling on the Great Barrier Reef; logging in the north-east rainforests; extensive tourism development; and the conservation status of coastal islands such as Hinchinbrook and Fraser Islands.

Students in both cities obtained a large proportion of their environmental information from television. However, more students in Melbourne than in Brisbane reported gaining most of their information from schools (χ^2=38.70, p<.000) and the print media (χ^2=26.97, p<.000). Melbourne students also identified the media, especially television (χ^2=32.18, p<.000), newspapers (χ^2=43.36, p<.000) and schools (χ^2=62.30, p<.000) as more reliable than Brisbane students. As a consequence it could be expected that there was a perception of better informed media coverage of the environment in Melbourne than Brisbane. Media coverage does not therefore seem a likely explanation for the differemce in environmental beliefs, awareness, knowledge and reported action referred to above.

More effective environmental education in the Brisbane school system, therefore, remains an attractive explanation. It would account for the striking consistencies in higher scoring to questions tapping students environmental awareness and knowledge. Students' knowledge of the fundamental concepts dealt with by the questionnaire was obviously strongly related to the education students received. It should, however, be noted that Brisbane students stated that they received significantly less of their environmental information from school than Melbourne students and thought that it was somewhat less reliable. However, it is possible that the more Brisbane students knew about environmental problems, especially local ones where much was at stake, the more critical they were and the more they expected their school to devote attention and provide up-to-date environmental information. More Brisbane than Melbourne students reported talking outside of class on a weekly and monthly basis (χ^2=4.24, p<.05). Students in both Melbourne and Brisbane reported that they would like more attention to environmental education in class.

Gender differences

Differences between the responses of female and male students were consistent across several parameters investigated. More female students than male students believed that Australia should concentrate on protecting the environment even if it meant some damage to the economy (χ^2=264.43, p<.000). More females also believed that it would be possible to have both a prosperous economy and a healthy environment, while more males were unsure about this (χ^2=13.92, p<.000). The beliefs of female students were also consistently more closely aligned with an environmental paradigm (t=15.59, p=<.000). Female students also had stronger conceptual knowledge than male students (t=5.14, p<.000), correctly defining more than five out of the ten concepts significantly more often.

These differences in attitudes and knowledge were reflected in higher levels among female students of being involved in improving the environment (χ^2=305.29, p<.000), a more confident assessment of their action knowledge and skills (χ^2=30.14, p<.000) and more regular and extensive involvement in actions to improve environmental quality (χ^2=22.92, p<.000). More female students also reported that they felt positive about the actions they had taken than did males (χ^2=119.42, p<.000) and that they received support from all sources listed in the questionnaire, including from: family (χ^2=18.39, p<.000) close friends (χ^2=122.51, p<.000), other friends (χ^2=55.63, p<.000), people involved (χ^2=119.01, p<.000), and teachers (χ^2=24.43, p<.000). Fewer females than males reported that cost (χ^2=17.47, p<.000), time pressures (χ^2=10.72, p<.000), lack of interest (χ^2=142.99, p<.000), and a belief that it was easier not to worry about the environment (χ^2=4.93, p<.05) were reasons for not acting in the best interests of the environment. Instead, females more often than males stated that their reasons for this included: not understanding what was harmful and what was not (χ^2=145.44, p<.000) and a lack of awareness of practical alternatives (χ^2=75.34, p<.000).

Although male and female students shared similar views about the three most important societal goals for Australia, their views about the most important environmental issues in Australia were different. More female students identified endangered animals (χ^2=11.80, p<.000), while more male students rated soil erosion and land degradation as most important (χ^2=18.74, p<.000). They also differed in the sources from which they obtained most of their environmental information. Male students not only gained more of their information from television (χ^2=25.76, p<.000), they also rated it as a more reliable source than did female students (χ^2=12.19, p<.000). On the other hand, more female than male students rated newspapers (χ^2=152.00, p<.000), school (χ^2=17.59, p<.000) and NGO's (χ^2=65.10, p<.000) as their most important sources of information. They also rated these same sources as more reliable than male students—newspapers (χ^2=21.89, p<.000), school (χ^2=7.65, p<.01) and NGOs (χ^2=125.43, p<.000).

'Overall, these findings are consistent with those from other research'

Overall, these findings are consistent with those from other research which consistently show, both in Australia and elsewhere in the western world, that women are more environmentally conscious and active than men. They also suggest that the higher levels of environmental attitudes and knowledge among female students may be a good indicator of interest in discussing environmental concerns both outside of school (χ^2=106.06, p<.000) and in class (χ^2=107.87, p<.001), and living a more environmentally friendly lifestyle.

High performing schools and all schools

Students in the sample of high performing schools displayed a higher awareness of environmental concepts

https://doi.org/10.1017/aee.2014.28 Published online by Cambridge University Press

(t=5.01, p<.000) and consistently higher overall knowledge scores (t=12.82, p<.000) than students in the general sample. More students from high performing schools also believed it was possible to have both a prosperous economy and a healthy environment (χ^2=33.71, p<.000). At the same time they also were more likely to believe that economic growth might be at the expense of the environment than students in the general sample (χ^2=11.21, p<.01). Students from high performing schools also were more inclined to identify government regulation (χ^2=14.33, p<.000) and personal lifestyle change (χ^2=4.57, p<.05) rather than communities working together as key strategies for improving environmental quality.

Although there was very little difference between students in general and high performing schools in their reporting of the individual actions that they had undertaken, a slightly higher percentage of students from high performing schools reported having taken deliberate actions in the past to improve the environment (χ^2=12.42, p<.000). One possible explanation of this is that students from high performing schools might more readily recognise their individual behaviours as representing deliberate actions for helping the environment than other students.

There were very few differences in the environmental orientation of the two samples. Students also shared similar views about their most important sources of environmental information, although more students in the general schools sample reported that school was the most important source of their environmental information (χ^2=8.94, p<.01). Similarly, there were few differences in perceptions of the reliability of information sources, although students in the general school sample were more inclined to rate television as reliable than were students from high performing schools (χ^2=31.20, p<.000).

Students and teachers

There were quite significant differences between the responses of teachers and students. Teachers displayed a much greater awareness (t=-9.83, p<.000) and knowledge of key environmental concepts (t=-22.84, p<.000). However, there were some notable gaps in teachers' awareness and knowledge. Only just over half of the teachers had heard of seven or more of the ten concepts, while a majority reported that they had never heard of the precautionary principle (79%) and of intergenerational equity (62%). Correct definitions did not exceed 89% for any concept and a fundamental concept such as 'ecology' was correctly defined by only 75% of teachers.

Teachers' environmental attitudes were somewhat stronger in terms of their environmental orientation (t=-3.11, p<.01). They believed more strongly than students that it was important to concentrate on protecting the environment rather than on economic growth (χ^2=40.01, p<.000). Teachers were also more likely than students to believe it was possible to have both a prosperous economy and a healthy environment (χ^2=37.59, p<.000), and to report stronger views about the importance of government regulation and legislation (χ^2=98.29, p<.000), personal lifestyle change (χ^2=43.64, p<.000) and communities working together (χ^2=15.89, p<.000) as strategies for improving environmental quality.

'teachers' rankings of social and environmental goals for Australia and the world were significantly different from students'

The teachers' rankings of social and environmental goals for Australia and the world were significantly different from students'. The teachers ranked creating a fairer and more humane society as the most important societal goal for Australia (χ^2=121.91, p<.000). By contrast, students rated protecting the environment as first on their list of goals (χ^2=37.76, p<.000), followed by preventing war and nuclear threats (χ^2=14.30, p<.000). The teachers rated soil erosion and land degradation (χ^2=299.12, p<.000) as the most important environmental issue facing Australia, and over-population as the most important environmental issue for the world (χ^2=81.94, p<.000).

Teachers reported a stronger desire to do things for the environment than students (χ^2=57.95, p<.000) and a stronger perception of their skills and abilities to do things to help the environment (χ^2=18.45, p<.000). The teachers also reported taking more actions to improve the environment (t=-14.11, p<.000). This is to be expected since their scope for such action-taking opportunities would be much greater than that of young people. The most commonly stated reasons given by teachers for not taking more environmentally friendly actions included: a lack of practical alternatives (70%) (χ^2=81.04, p<.000); lack of time (52%) (χ^2=34.64, p<.000); and the cost (47%) (χ^2=37.11, p<.000). Teachers were slightly more likely to report gaining information about the environment from newspapers (χ^2=5.33, p<.05) than students, but like students—and adult Australians in national surveys, for example Keys Young (1994)—they rated television as the most common source of environmental information, and information from environmental NGOs as the most reliable.

Conclusions

Many of the students surveyed show a strong orientation towards the adoption of an environmental paradigm. This is supported by their ranking of the environment as the most important issue for Australia and their belief in the importance of balancing the economy with environmental imperatives. These beliefs have not, however, automatically translated into their personal lifestyles as only 55% of students reported having consciously taken action to protect the environment and, indeed, such actions were mostly limited to household behaviours such as recycling. Most students indicated that they were unwilling to perform such civic actions as writing a letter or signing a petition let alone participating actively in an environmental group or campaign.

https://doi.org/10.1017/aee.2014.28 Published online by Cambridge University Press

The complex nature of attitude/behaviour relationships is well exemplified by the list of answers offered as reasons for not taking more environmentally friendly actions. Many different answers were offered, with no one or two predominating. The fact that only a small percentage of students (below 13%) listed 'I'm not interested' or 'I don't believe everything people say about damage to the environment' indicates that a lack of concern or doubt about the significance of environmental problems are not seen as barriers to personal change. Deciding to live a more environmentally supportive lifestyle requires a number of basic pre-conditions. These include (Prior 1994, Jensen 1995, Levy-Leboyer et al 1996):

- awareness and concern about the seriousness of threat and risk
- awareness of the range of possible responses to the threat, including the personal actions individuals can take
- a sense that the problem is one about which individuals need to take personal responsibility
- confidence in one's own personal skills, and
- a positive judgement about the likely effectiveness of the proposed actions.

'much more needs to be done to increase present levels of student environmental responsibility and action'

The Melbourne and Brisbane studies suggest that the young people in both cities had a clear perception of the threats to the environment and some awareness of the importance of personal action and responsibility. There was also a strong sense of personal desire to help the improve environmental quality. Despite this it is also evident that the young people, who were only one or two years off voting age, perceived themselves as having low to moderate levels of environmental action knowledge and skills. This indicates that awareness of the personal actions that individuals can take was not enough: actual experience of taking environmental actions is also important. The fact that only around a half of all students reported having taken deliberate action for the environment—or were willing to do so in the future—suggests that much more needs to be done to increase present levels of student environmental responsibility and action.

There are important implications here for education. Environmental education has often been described as having three key components—education about the environment, education in the environment and education for the environment (Fien 1993). Much of the educational debate has been about the lack of, and the need for, education for the environment (see Robottom 1987). This much needed emphasis on education for the environment necessitates education about environmental decision making, beliefs, values changes and ethics. Moreover the present study suggests that education for active environmental concern and participation should also include learning through local community action projects. That this is the case is suggested by students' strong pro-environmental orientations, but their low levels of reported experiences in performing environmental actions and their low self-perceptions of skills and knowledge for carrying out such actions. This underlines the importance of providing opportunities for students to learn how to approach environmental problems, demonstrating the models and tools available, and showing students how to use them. Two successful examples of this include the 'Action Research: Community Problem Solving' model of teaching (Bull et al 1988), and the 'Investigation, Vision, Action and Change' (IVAC) approach to learning through action on local environmental problems and issues (Jensen 1995). Such approaches aim to develop not only environmental knowledge, but also socially critical thinking, the pre-requisite skills for action, and the desire to act in environmentally responsible ways via action on local and global issues (Fien 1993).

This study also shows the need for more comprehensive teaching of basic environmental concepts both for students and teachers. Not only were student awareness and knowledge low, especially for some concepts, but the environmental awareness and knowledge of teachers were often equally low. An understanding of the nature of environmental problems is fundamental for any approach to addressing their solutions. Australia has only recently produced its first comprehensive and independent state of the environment report. With this publication and an innovative teacher's guide and support package (Environment Australia 1997) now available to schools it is to be hoped that there will develop among teachers and students a much better understanding of Australia's most important environmental problems.

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