

Section 2: Research

What Student's Perceptions Tell Us About Teaching Environmental Education.

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About the Authors

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Introduction

Throughout Australia there has been a substantial interest in environmental education for more than a decade. Much human and financial effort has gone into curriculum development at the school level and into support for implementation via inservice education, conferences, workshops, etc. Relatively little systematic evaluation of these efforts has been undertaken at the level of what students are learning.

Most definitions of environmental education internationally and in Australia emphasise the importance of affective learning concerning the environment alongside more usual cognitive knowledge and skills. Accordingly any evaluation should recognise this somewhat unusual balance among the intended learnings compared with most other subject areas.

Recent research in several areas of school learning has brought out the importance of starting with an explicit recognition of the perceptions and understandings students already hold about topics. Teaching and learning of the topic then ought to be processes that enable the learners to generate or construct, from these starting points, new understandings and perceptions. There has, however, been almost no research, apart from a comparative study by Schaeffer and his co-workers of West German and Phillipino secondary school students' associations with the word, ENVIRONMENT. (Schaeffer, 1979; Hernandez, 1981; Villavicencio, 1981). This paper reports an attempt in Victoria to begin to fill these gaps.

Sources of Data

The students in our study were in neighbouring primary and secondary schools in an outer-eastern suburb of Melbourne. By this choice it is likely that learning influences about environmental matters from outside the school will be very similar across these schools. The students' learning was assessed in Years 5, 7, 9 and 11 where 189, 161, 188 and 105 students were involved respectively.

Special environmental education was included in the curriculum of one class of Year 5 students and in the Year

8 classes at one of the two high schools. Thus the design of study enabled a comparative evaluation to be made of school efforts to develop environmental knowledge and attitudes compared with the general learning that is likely to occur in Australia today when environmental issues run very regularly through the media and other extra-school influences.

We (Fensham and Johnson, 1985) have reported elsewhere on the validity and reliability of the instruments—word association tests and responses to sets of environmental photographs. The word associations are particularly useful for gaining a general picture of cognitive learning that links in the students' minds with topics like ENVIRONMENTAL, CONSERVATION, POLLUTION, and GREENIE. Each word is presented and the students are given time to write down as many words, phrases or ideas that come into their mind when they focus on the stimulus word.

The responses to the photographs are more useful in eliciting affective responses since there is evidence from other studies by Novak (1981) and Edwards and Marland (1984) who have both reported that students are able to recall and report their feelings about situations presented to them visually. Indeed Ponniah (1983) used photographic stimuli in her pioneering study of the localness of environmental awareness among Victorian secondary students.

Three sets of six photographs of environmental situations were used and students were asked to choose two in each set that were their preferred choice with respect to the following tasks.

- Set 1 Task 1 Select two (2) of these scenes that you would be happy/pleased to be in. Give your reasons.
- Set 2 Task 2 These six (6) photographs each show an environmental problem. Select any two (2) of them and state the problem shown in the photograph.

Set 3 Task 3 If you could choose what your science lessons were to be about for the rest of the year, which two (2) of these topics would you choose to study? Give your reasons.

Tasks 1 and 3 were particularly aimed at affective learning in the students whereas Task 2 sought data on the extent to which the cognitive skill of identifying environmental problems exists.

Results and Conclusions

The responses to the associations were categorised by stages into 10 categories for each stimulus word and these are listed in Table 1.

For this report we present the data in terms of the percentage of students in each responding group giving at least one association in a category. These percentages emphasise the variety of sorts of associations the students are making rather than the intensity with which a given response category is used.

Categories with scores of over 50% (**) and between 25 and 50% (*) in Table 1 are ones used by a relatively large proportion of students. Those with less than 25% are familiar to relatively few students.

By Year 11 some changes in the awareness of students regarding the meanings they associate with these words do occur, and in general more categories are commonly used.

Some other cognitive findings of significance for environmental educators are now reported.

The term GREENIE has been widely associated in Australia with the environmental movement since the 1960s when the BLF in Sydney put green bans on proposed developments in the Rocks area. Such a meaning for this term is not evident from the word associations until Year 11 by which time about 50% of the students in both schools reported words in the categories, Conservation and Protection. The formal EE curriculum in Grade 8 in one of the schools does not appear to have contributed to this sort of linkage. The interaction of external influences and the older age of the Year 11 students seems to be the likely source of this learning.

The large majority of the students associate pollution with the atmosphere, but do not make other obvious and possible environmental associations. The EE curriculum in the Grade 5 class was successful in emphasising this but the Grade 8 curriculum does not appear to contribute to the students' awareness of POLLUTION.

Until Year 8 about half the students gave no association with CONSERVATION and again the curriculum in Year 8 showed little lasting effect on the students' knowledge associations despite its apparently obvious possibilities for exclusion in studies of various ecosystems that made up this EE curriculum.

Apart from the Year 5 students, all the others made a number of associations with ENVIRONMENT, and age rather than the curriculum intervention in Year 8 seemed to be the most effective factor in this learning.

CATEGORY FOR RESPONSES	KEY WORD STIMULUS AND STUDENT RESPONSES (%)							
	GREENIE		POLLUTION		CONSERVATION		ENVIRONMENT	
	Yr 7	Yr 11	Yr 7	Yr 11	Yr 7	Yr 11	Yr 7	Yr 11
Living Things								
Nature	39*	56**	14	19	29*	51**	65**	63**
Health	6	47*			18	40*	20	30*
Values	15	15	46*	47*			18	36*
People	12	23	26*	18	13	20	15	38*
Water	22	62**	4	14	7	45*	30*	42*
Human Products			19	36*	4	27*	13	21
Conservation	16	26*						
Protect/Protection	2	24						
Symbols	2	29*			55**	50**		
Mucous	35*	36*						
Chemical	75**	16						
Waste			11	26*				
Atmosphere			48*	66				
City			93**	97**			14	29*
Unrelated			40*	70**				
Land			10	16	5	11		
Preserving								
Energy					13	47*		
Built Environment					0	4		
Natural Environment					6	17	44*	46*
Surrounding Space							41*	40*
							43*	57*

Table 1: The percentage of students in Years 7 and 11 whose word associations to the key environmental words were in various categories.

The curriculum in the Year 8 classes of the EE school places a strong stress on education about natural environments and evidence for that sort of learning does not appear in the categories of association commonly reported by its students.

Cognitive Skill Readiness

Since environmental education in its FOR the Environment form is concerned with the learning of problem solving skills, it is important to know how well students are able to identify an environmental situation as being a problem. To measure this ability students were given a set of six (6) photographs showing various environmental problems. They had to select TWO (2) of these and state what problem was.

Table 2 indicates the preferences of students for the various environmental situations and identifying the problem in them.

Environment Situation	Year 7	Year 11
A Dust Storm over City	56	57
B Noise	9	17
C City and Traffic	10	10
D Rusting Cars	14	10
E Litter on Beach	25	30
F Dead Fish on Lake	86	76
	200	200

Table 2: Percentage of students choosing an environmental problem to identify. (NB. Students made 2 choices, thus the percentages total 200).

For task 2 – the recognition of environmental problems – students of all age groups and irrespective of exposure to the curricula in the two schools showed a marked preference for situations F, A and E. This does not mean that they were unable to identify problems in the other three situations (B, C and D), but that they were able to identify more readily with F, A and E.

The way the students described the problems they recognised in the photographs could be classified as CAUSE or EFFECT. For instance, for F – the Dead Fish on a Lake – comments such as ‘they are dead because of pollution’; ‘there must be oil in the water’ were classified as being causal statements. Whereas, statements like ‘the fish are dead’; ‘it is awful’ were considered to be statements of the effect of the problem. The tendency among the students to use these two sorts of descriptions added further detail about their level of identifying with the problem.

Additional Readiness

The students, at any of the school levels we have investigated, are neither blank minds nor empty of skill about some aspects of the environment. Similarly it can be expected that they will have some attitudinal predispositions that EE teachers would do well to recognise. Signs of these attitudes were present among the word associations but apart from the task with the word POLLUTION less than one third of the students used

attitudinal words. The Year 5 students who had the FOR the environment teaching in class showed strong evidence of attitudinal associations.

In the first task with the photographs of environmental situations the students indicated their affective preference for environments. There was a very clear preference at all age levels among the outer suburban (not coastal) students for the Beach environment. The small Country Town scene attracted almost half the students at Years 9 and 11 but the Central Australian scene and the City River Bank attracted positive responses from only a few students. The Forest and the City Street were attracted at about the average level given the very high affinity for the Beach. Recreational and Aesthetic reasons were almost the only sorts of statements to accompany the choices of preferred environments and at Year 5 reasons for a choice were difficult.

Of the six environments that the students were offered as objects for ‘study in your science course for the rest of the year’, Solar Energy and the Coastal Rock Platform were more attractive than average all age levels, whereas the ‘Farmland showing the effect of salt in the soil’ attracted less than 20% even at Year 11. The Rainforest, Mining Scene and Cattle on High Plains were all about average. If, as it is sometimes claimed, soil problems are Australia’s main environmental problem, then teachers of Australia’s great majority of urban students will need to recognise that it is not a topic to which they will readily respond.

Conclusion

Both the probing techniques that generated the data of this research could be used by teachers when introducing a topic in environmental education to a class (at least for children from Year 5 onwards). The first simply requires the students to say what words they think of when a key topic word is given by the teacher. The second involves direct questions of recognition, affect, and interest in pictorial examples of the contextual situations of the environmental topic to be taught.

There are a number of grounds for encouraging the use by environmental teachers of these two introductory procedures.

Firstly, they alert the learners to what topic or focus of their learning is to be and they both engage the learners actively in the topic immediately. Secondly, they provide a wealth of information to the teacher about what their students know already about the topic, how they perceive it and how they feel about it. A teacher can then use this information to assist the students to relate the new learning in this topic to what they already know. We take a constructivist view of learning such as that described by Novak (1981) (in an early account of this increasingly accepted approach), and by recent Australian authors like Baird and Mitchell (1986) and Middleton et al (1986). The essence of this approach to teaching and learning is to enable learners to develop what they know already into new learning in an evolutionary way. Accordingly, knowledge of where their students are already in relation to a new topic (cognitively and affectively) is an essential tool for the constructivist teacher.

Environmental education, without identifying a learning theory, has consistently advocated an approach that is consistent with these views since active and participatory roles for environmental learners has always been one of its major tenets (see for example, Fensham and May, 1979).

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