

Environmental Education in Western Australian Secondary Schools

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A B S T R A C T

This paper reports on research carried out to investigate the extent of environmental education in Western Australian secondary schools. The research found: a high level of support for environmental education amongst teachers, that environmental education was being pursued to some extent in all responding schools, that there existed areas of neglect which were often politically controversial and divisive contemporary issues, and that city schools were generally more involved in environmental education than country schools and public schools more than private schools.

Barriers to the further implementation of environmental education in schools are identified and recommendations made to improve the availability and standard of environmental education in Western Australian secondary schools.

Awareness of the scale, severity and complexity of environmental problems confronting Western Australia and elsewhere has been growing since the early 1960s (Fien 1993). Greig et al. (1987) wrote that the deteriorating condition of the earth's biosphere was coupled with a huge increase in public consciousness of and interest in environmental issues. Since then the increasingly extensive coverage of environmental issues in all mass media may be seen as a reflection of this heightened public interest in and concern for the environment.

The emergence of national and international environmental education journals indicated that teaching professionals were also recognising the significant role the environment plays in humanity's well-being and thus its important place in school curricula. At national and international government levels UNESCO's International Environmental Education Programme focuses on incorporating environmental education into the formal education systems of all its member states (Vinke 1993).

This paper provides a brief account of research more fully reported in Ross and Dingle (1996), copies of which are available from the author. The research sought information about environmental education in Western Australian secondary schools which encompass years 8 to 12 in lower school and years 11-12 in upper school, with student ages ranging from 13 to 18. At the end of year 12, students may take the Tertiary Education Entrance examination.

The primary aims of the research reported here were to:

- establish which projects of an environmental nature were being carried out in secondary schools in Western Australia
- determine which subject areas were receiving attention in the classroom and which were being neglected
- note any differences in the comprehensiveness of environmental education which might have existed

between city and country schools, and between public and private schools

- determine, on the basis of comments made by respondents and others, the perceived barriers to the implementation of environmental education in secondary schools

Method

Questionnaires were chosen as the principal method of data collection. The completed questionnaire is in Ross & Dingle (1996), as are definitions of terms such as city school, country school, public and private schools.

Initially a draft version of the questionnaire was tested on six high school teachers. As a result of their comments several changes were made with the intention of making the questionnaire easier to complete. The final questionnaire consisted of four sections:

1. the first section set out to establish details about respondents, such as name, contact telephone number, position in the school and the courses they taught.
2. the second section was concerned with the degree of a school's engagement in environmental issues based on the number and kinds of projects carried out in the school. Participants were required to indicate, from a list, the environmental projects in which their school was involved.
3. the third section consisted of five tables each of which dealt with a specific environmental subject area: marine and aquatic systems, energy, resources, pollutants and waste treatment. Each table contained a list of topics pertinent to the particular subject area; in all, 34 topics were listed.
4. the final section of the questionnaire asked general questions about respondents' sources of environmental information. They were also asked to name the areas of the environment about which they would like more

information, to list the environmental courses available to them and the courses they would be interested to attend. The questionnaire asked respondents whether they thought that environmental studies should be included in the secondary school curriculum and, if so, where it might best be placed.

Respondents were encouraged to make further comments.

Questionnaires were sent with a short covering letter to each of the Heads of the Social Studies and Science Departments in the 147 secondary schools in Western Australia. After one month a further questionnaire with a reminder letter was sent to those Heads of Departments who had not replied to the original request.

The covering letters introduced the project and the researcher to the recipient and requested completion and return of the questionnaire. Although a telephone number was provided should respondents require assistance in completing the questionnaire no recipient availed themselves of this opportunity and no other communication with recipients took place.

Because 'the environment' is a broad concept and the questionnaire covered subject areas belonging to both the natural and social sciences it was felt that no respondent would have all the knowledge required to answer the questionnaire accurately without assistance from colleagues. In order to get as complete a picture as possible respondents were encouraged to request assistance from others as required.

Additional information was gathered through personal contact with a range of organisations involved in environmental education. These included:

- Men (sic) of the Trees, whose Open Day on 8 April 1995 was conducted on the theme 'Environmental Education'
- Social Studies Association of Western Australia. Several workshops at their annual conference, held on the 19-20 August 1995, dealt with matters related to environmental education
- Australian Association for Environmental Education (WA chapter). Regular monthly meetings with either a guest speaker or general business related to environmental education
- government departments: Department of Environmental Protection, Department of Agriculture, Education Department of Western Australia, Department of Conservation and Land Management
- Perth Zoo
- environmental groups: Greenteach
- political parties: Greens WA
- community projects: Ribbons of Blue, City Kids

Results

100 replies from 79 schools were received. Eighteen schools sent multiple replies; the consistency of the answers to the questions in section 2 was used to assess the accuracy of the information supplied by respondent. Answers to section 2 were found to be about 80% consistent in schools which provided multiple replies.

Section 1: Participant details

Replies were evenly divided between Science Departments and Social Studies Departments. Generally response rates were lower from private schools than public schools and from country schools than city schools.

Table 1: Schools in the study by region and type

Region	School type	Questionnaires	
		Sent	Returned
City	Public	57	36 (63%)
	Private	51	23 (51%)
	Subtotal	108	59 (55%)
Country	Public	30	17 (57%)
	Private	9	3 (33%)
	Subtotal	39	20 (51%)
Total		147	79 (54%)

Section 2: School involvement in environmental projects

As shown in Table 2 the study found that environmental projects most commonly carried out in responding schools were those in the recycling and reuse categories; planting and rehabilitation projects were also common. One third of respondents reported that their school was involved in environmental projects with the local community.

For the 16 projects listed there was no obvious difference between the average number of projects reported for city public and private schools; 6.4 versus 6.1. However, a slight difference was apparent between country public and private schools; 5.7 versus 4.0. The average number of projects carried out in country schools was lower than in city schools.

Table 2: Environmental projects run by schools

Projects	City (59)*	Country (20)*	Total (79)*
Recycle photocopy paper	52	11	63 (80%)
Recycling project	48	13	61 (77%)
Reuse stationery	42	16	58 (73%)
Shade house at school	32	13	45 (57%)
Rehabilitation of local area	27	7	34 (43%)
Planting project	24	8	32 (41%)
Energy monitoring	25	4	29 (37%)
Ribbons of Blue	22	5	27 (34%)
Local community project	19	8	27 (34%)
Seeding project	21	6	27 (34%)
Horticulture course	13	9	22 (28%)
Water monitoring	14	4	18 (23%)
Permaculture course	10	1	11 (14%)
Green waste monitoring	10	1	11 (14%)
Other school links	6	2	8 (10%)
Earth care centre at school	4	1	5 (6%)

*number of schools returning questionnaires

Section 3: Numbers of topics taught in in 5 environment-related subject areas

Little difference in the average number of topics taught was found between city public and private schools. On average 21.0 of the 34 listed topics were taught at the lower school level and 17.5 at the upper school level.

However for country schools the study found that public schools taught an average of 16.6 topics at the lower school level and private schools taught 24.0. The opposite situation was reported at the upper school level where 17.6 topics were taught on average in public schools compared to 14.0 in private schools.

As summarised in Table 3, of the subject areas covered in the survey, the most common area of study in lower schools was 'Marine and aquatic systems'; 96% of responding schools reported teaching an average of five of the nine listed topics. This was followed by the subject area 'Resources' in which 93% of responding schools indicated that they presented an average of seven of the nine listed topics. The subject area 'Pollutants' was also given obvious attention; 92% of responding schools reported teaching five of the eight listed topics.

At upper school levels 'Resources' and 'Energy' were the subject areas most commonly reported as being taught. In the case of 'Resources', about 90% of responding schools taught an average of between five and six of the nine listed topics. For 'Energy', a similar proportion of responding schools taught three of the four listed topics.

The least taught subject area for both upper and lower schools was 'Waste management' with 73% of responding schools reporting teaching between two and three of the four listed topics.

Table 3: Subject areas and topics taught

Subject area (number of topics within each subject area)	Lower schools		Upper schools	
	% of schools teaching area	% of listed topics taught	% of schools teaching area	% of listed topics taught
Marine (9)	96	63	84	47
Energy (4)	77	66	91	80
Resources (9)	93	74	92	61
Pollutants (8)	92	61	86	58
Waste Mgt (4)	73	61	73	60

Section 4: Part 1—Sources of environmental information

Table 4 summarises the responses which indicated that over 75% of respondents named the media as being their main source of environmental information.

Table 4: Sources of environmental information used by respondents

Source	Percentage of respondents using source
Television/radio	84
Newspaper	83
Magazines/journals	73
Books	61
Environmental groups	43
Colleagues	23
Friends	13
Family	9
University courses	5
Science Teachers Association of WA	4
Dept of Conservation and Land Management WA	4
Industry	3
Greening WA	3
Water Corporation	2
In-service training	2
Environment Protection Authority of WA	1
Education Department	1

Section 4: Part 2—The importance and place of environmental education in school curricula

There was unanimity in respondents' views that environmental education should be included in high school curricula. Comments on the questionnaire showed the strong interest respondents had in increasing the level of environmental education available in their schools. The measure of their commitment was also indicated by the fact that several respondents had already developed their own environmental studies courses and were taking steps to integrate these into their schools' curricula.

57% of respondents stated that environmental education should be integrated throughout school curricula. A further 17% indicated that a stand-alone option should be implemented for environmental education; 18% of respondents favoured the use of both integrated and stand-alone approaches.

Participants were asked whether they considered there to be room in the school timetable for a stand-alone environmental education course. 67% of the 51 respondents who answered the question considered there to be room in the lower school timetable, and 60% of the 57 respondents who answered the question for the upper school timetable considered that room existed there.

Section 4: Part 3—Barriers identified to environmental education in secondary schools

Respondents were not explicitly asked about what they considered to be barriers to the implementation of environmental education in schools. However 38 respondents provided comments which are set out in full in Ross and Dingle (1996). These included statements on the following perceived barriers:

- one respondent noted a lack of in-service training in "the technology involved in hands-on environmental education"
- another found only a luke-warm response from the Secondary Education Authority when he tried to stimulate interest in the development of an Environmental Studies unit for year 12 students
- another noted the difficulty of arousing enthusiasm for environmental issues in a mining town
- others thought there was a lack of: access to material "appropriate to student ability", "worksheets, equipment and measuring devices", "time and resources" and resources providing "facts and figures, and balanced and impartial accounts summarising the points of view of conservationist and scientist and also dealing with social, political and economic arguments"
- one teacher thought that students would not see the "relevance [of environmental issues] to their study/life"

Other major barriers to emerge from the literature research and which have been confirmed to varying degrees in the

current study by respondents and others include:

- a lack of support networks to assist teachers, especially those in country areas
- a lack of teacher support from school administrators and principals (Lisowski & Disinger 1988, Robottom 1990, Samuel 1993)
- a lack of understanding of environmental issues on the part of teachers (EPA 1993, Fraser 1993)
- too little pre-service and in-service training (Dunlop 1993, EPA 1993, Robottom 1990, Samuel 1993, Vinke 1993, Walsh 1987)

Discussion

1. The importance of environmental education

Questionnaires were returned from 54% of secondary schools, a high rate of return in comparison to two similar studies (EPA 1993, Fraser 1993) carried out in Western Australian schools. The eight page questionnaire was comprehensive and required thought and time in its completion, so that the high response rate could indicate respondents' strength of positive feeling towards environmental education. This opinion is further heightened by the unanimously positive response to the question about whether environmental education should have a place in high school curricula.

Recommendation 1

That the Education Department of Western Australia respond to teachers' views about the importance of environmental education by according it a high priority in secondary school curricula.

2. Environmental and community projects

The environmental projects most commonly being conducted in responding secondary schools were concerned with recycling and with the reuse of stationery. To determine why three-quarters of schools returning questionnaires were engaged in these projects may provide clues about how other worthwhile but currently less popular projects could achieve higher participation rates. It seems logical to suggest that recycling projects are comparatively easy to organise and provide participants with an early sense of achievement, unlike monitoring and rehabilitation projects which may take years to show signs of success; this is an area for further research.

34% of schools were involved in environmental projects with the local community. One respondent from a mining town school rated the success of a field trip conducted by two environmental scientists employed by a local mining company as excellent in raising participants' awareness of environmental problems of their region. The respondent recorded their strong intention that the program would

continue in following years. Fraser (1993) noted that when teachers and classes worked with the local community both groups could benefit from the other's specialist knowledge and that therefore community projects should be encouraged. Community involvement can offer many advantages including ongoing support, outside expertise and a sense of relatedness between the school and the community. Such advantages outweigh the logistical disadvantages usually accompanying such cooperative projects. 'Sister-school' partnerships between schools from different kinds of regions, mentioned as useful by some respondents, could also be set up with the aim of introducing students to issues outside their everyday experiences.

Recommendation 2

That the Education Department of Western Australia determine why some projects such as recycling are very popular in schools while other equally worthwhile projects such as permaculture, waste monitoring and energy monitoring are less so.

Recommendation 3

That teachers and members of the community set up links with the aim of increasing student's awareness of environmental and lifestyle issues in their neighbourhood.

3. Environmental topics taught

Between 73% and 96% of schools reported offering about two-thirds of the topics listed under the subject area headings used in the questionnaire. Although these figures may seem high, this research was quantitative and says nothing about the quality of understanding gained by students on completion of their studies. This is also an important area for further research.

The research found that a variety of important environmental issues were being neglected. These included wetland protection and the importance of wetlands to migratory birds, the effects on fish stocks of overfishing, gas-fired versus coal-fired power stations, indoor and outdoor air quality. Each of these neglected topics was controversial and had been the subject of heated debate in Western Australia in recent times. A follow-up research project could look into why such topics were being neglected.

Recommendation 4

That research be encouraged into the comprehensiveness of students' curriculum experiences in environmental education and into the quality of the environmental learning derived from them.

4. Sources of environmental information

The importance of the media as a highly significant source of environmental information in our society was indicated by the research. The concentration of media ownership in Australia, however, poses the problem of how to ensure balanced and unbiased reporting of controversial and often complicated social and political issues. Further, Chipman and Brody (1993) reported UK research showing that children whose main source of environmental knowledge was the media, through private reading, radio and TV, had a significantly higher level of environmental knowledge and a more positive attitude towards the environment than did students whose primary knowledge source was general education at school, special courses, or talking with parents and friends.

Recommendation 5

That teachers incorporate into their lessons balanced accounts of environmental issues, as reported in the media and conservation journals using these issues as the basis for discussion and in-depth analysis.

5. The place of environmental education

This project and previous research (EPA 1993; IUCN, UNEP & WWF 1980) has noted strong support for the notion that a stand-alone environmental education course be introduced into secondary schools, as well as for its integration throughout curricula. This project has shown that the number of environmental topics taught in upper schools dropped by about 20% compared to the number taught in lower schools. A Tertiary Education Entrance (TEE)-scoring, stand-alone Environmental Studies course would enable and encourage senior school students to broaden and deepen their study of environmental topics.

Recommendation 6

The Education Department of Western Australia include Environmental Studies as a stand-alone secondary school-wide course and as a TEE-scoring course in senior secondary curricula.

6. Teacher education

An alternative, or addition, to a stand-alone course is the integration of environmental studies throughout school curricula. However, even noting that over half the respondents in this survey considered this integrated approach the most desirable this can only be a successful means of environmental education if all teachers are knowledgeable about and confident in their ability to teach about environmental issues. It is essential therefore, as noted by Simmons (1993), that teacher education at pre- and in-service levels provides student and practising teachers with a range of experiences appropriate to their obtaining a comprehensive understanding of environmental

matters and the skills necessary to teach them.

Recommendation 7

In order that environmental studies can be successfully integrated throughout school curricula teacher education at pre- and in-service levels include opportunities to acquire a comprehensive understanding of environmental issues and the skills necessary to teach them.

Summary

The study reported here found unanimous support amongst secondary school teachers for a system of comprehensive environmental education in their schools. Three-quarters of respondents to the questionnaire indicated that environmental education should be integrated throughout school curricula while one-third stated that a stand-alone Environmental Studies course should be developed.

The study found that environmental education was being pursued to some extent in all responding schools, both through the running of environmental projects and as course material integrated into school curricula. However it also found areas which were being neglected; these were often politically controversial and divisive contemporary issues.

Generally city schools were found to be more active in environmental education than country schools and public schools more than private schools. This was the case both in the number of projects being run in schools and in the number of topics being presented in classrooms.

On the basis of comments made by participants in the research a number of barriers to successful implementation of environmental education in secondary schools were identified. These included a lack of pre- and in-service environmental education, a lack of direction and encouragement from the Education Department and school administrators, and a lack of accessible, balanced and impartial resources. None of these barriers are insurmountable however and the implementation of the recommendations made in this paper would improve the availability and standard of environmental education in Western Australian secondary schools.

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William Ross's recently completed BEnvSc included the research reported here. He has commenced a PhD examining the implementation of traffic calming measures.
