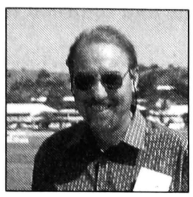
Factors Contributing to Intergenerational Communication Regarding Environmental Programs: Preliminary Research Findings

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A B S T R A C T

Given the increasing recognition of the potential for school students to act as catalysts of environmental change, research is needed to determine the extent to which school environmental education programs can facilitate intergenerational communication and learning in the home and wider community. The present paper reports on preliminary findings from a pilot study based on two environmental education programs. Four factors were investigated in terms of their influence upon the extent to which school students discussed the programs at home: student response to the program; student environmental orientation; parent environmental orientation; and family communication properties. In this study, program and family communication factors exerted the greatest influence on the frequency of discussions concerning environmental education programs experienced by students. Suggestions are made for ways in which environmental education programs can be designed in order to facilitate student-parent communication about environmental issues.

Recently there has been an increased realisation of the potential for school environmental education programs to influence the awareness, attitudes and behaviour of adults in the community (Ballantyne, Connell & Fien 1998, Uzzell 1994, Kruger 1992, Sutherland & Ham 1992, Wals, Beringer & Stapp 1990). Ways of capitalising on this potential include incorporating opportunities for students to facilitate environmental learning in their communities through action research approaches to teaching (Wals, Beringer & Stapp 1990) and promoting student action competence (Jensen 1995). These approaches have generally concentrated upon providing students with opportunities for influencing the attitudes and behaviour of adults within their communities. Little attention, however, has been paid to promoting the role that students can play as catalysts of environmental change and learning within their homes.

'research is needed to identify major factors involved in encouraging student-parent communication and learning encounters'

To increase the effectiveness of environmental education programs in supporting students as facilitators of environmental learning in their homes, research is needed to identify major factors involved in encouraging student-parent communication and learning encounters. However, few programs have intergenerational learning as an overt objective and few evaluations of this process are reported in the literature. Where such evaluation has been conducted attention has been focused predominantly on adults' influence on young people, rather than the reverse (Ballantyne et al 1998, Uzzell 1994, Uzzell & Rutland 1993a & b). These studies highlight the need to better understand the nature of student-adult communication. Questions which emerge include: What kinds of environmental education experiences tend to motivate students to share their school learning with their parents? How do student and parent environmental orientations and family relationships influence student-parent communication of environmental matters? This paper reports some preliminary findings in relation to these questions, based on an exploratory study of two environmental education programs in Brisbane, Australia. The results will be used to guide and inform further research in the area.

Method

Environmental Education Programs

Two environmental education programs designed for use with primary school students were selected for the pilot study: 'On the Brink' (Potter, 1993) and 'Powerwise' (Queensland Electricity Industry, undated). In many ways these are typical of environmental programs designed by external agencies to be used in formal and informal contexts. They have overt conservation objectives, attractive materials and a suggested approach for teaching/learning activities. Due to the focus of the programs, it was expected that 'On the Brink' would engender student/parent discussion in the home on issues such as the effects of feral animals, exotic vegetation and human actions in altering Australian landscapes and that 'Powerwise' would lead to discussions about safety and conservation regarding electricity use in the home. Accordingly, these programs provide a valuable context for exploring the process of student-parent communication and environmental learning.

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Participants

A class of 24 Grade 5 students from a metropolitan primary school participated in the 'On the Brink' program. A class of 26 Grade 7 students, from a different metropolitan primary school, participated in the 'Powerwise' program. All student participation rates in the various aspects of the research were high with most completing a pre- and post-questionnaire—see Table 1'. The students' parents also completed a questionnaire, and a smaller number volunteered to be interviewed.

Table 1: Response rates for each of the three research components

	Student questionnaire	Parent questionnaire	Parent interviews
Case-study 1 'On the Brink' (N=24)	22 (92%)	16 (67%)	5 (21%)
Case-study 2 'Powerwise' (N=26)	23 (88%)	15 (58%)	9 (35%)
Total (N=50)	45 (90%)	31 (62%)	14 (28%)

Procedure

'a combination of survey, observation and interview protocols was used'

In developing research methods for this study particular attention was devoted to assurances of confidentiality, and to developing research protocols respecting the privacy of families and the rich and complex nature of relationships between parents and young people. In data gathering a combination of survey, observation and interview protocols was used to focus on four sets of factors which related to:

- student response to the program—such as students' enjoyment, understanding of program information, perceived usefulness and change as a result of learning
- students' general environmental attitudes, knowledge and behaviour; and their attitudes, knowledge and behaviour towards the environmental topic specific to each program
- parents' specific and general environmental attitudes, knowledge and behaviour; and whether they initiated and/or elaborated upon conversations related to the program, and
- family communication—including student and parent perceptions regarding the frequency and nature of communication concerning general issues and the environment.

Prior to the commencement of the environmental education programs, students and their parents were invited to complete a questionnaire to identify:

- their general environmental attitudes, knowledge and behaviour, and
- their attitudes, knowledge and reported behaviour related to the specific theme of each program, that is, endangered flora/fauna or energy use.

Students were also asked to rate the frequency and nature of, and their satisfaction with, their general communication with their parents. Student questionnaires were administered to students in class, taking approximately 15–20 minutes to complete. Parent questionnaires were taken home by students and returned to the school.

One week after the program finished students completed another questionnaire designed to:

- re-visit their attitudes, knowledge and behaviour in relation to the theme of the program, and
- identify:
  - the extent to which they talked at home about environmental matters generally
  - the frequency and nature of discussions regarding the environmental education program in particular, and
  - their perceptions of the program.

After each program students' parents were invited to participate in an interview. Initially, the intention was to undertake focus group interviews. A trial of this process, however, indicated that the quality of data was compromised due to the perception that individuals were unduly influenced in their responses by the presence of other parents. Accordingly, individual parent interviews were conducted by telephone. These interviews explored the extent to which parents perceived that their children talked at home about the environment in general and the environmental education program in particular. Parent self-reports were used to substantiate student estimations regarding the nature and frequency of discussions about the program at home. Interviews were also conducted with participating teachers to identify their understanding of the nature and objectives of the program.

Instruments

Orientation scales

Students' general environmental orientation—knowledge, attitudes and behaviour—was measured using 25 items which were based on Leeming, O'Dwyer & Bracken's (1995) 'Children's environmental attitude and knowledge scale'. These items related to several environmental issues including energy, water, animals and recycling. A measure of reported behaviour was also included which incorporated four different types of actions people can undertake to help the environment—educative, physical, economic and political (Smith-Sebasto & D'Costa 1995, Ramsey 1993). Item scores were summed to produce a total score for each scale: ten items addressing general

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environmental knowledge, scored as correct or incorrect, yielded a 0–10 scale; five items addressing general environmental attitudes, using a 0–4 rating, yielded a total score of 0–20; five items addressing general environmental behavioural intentions, using a 0–4 rating, yielded a total score of 0–20; and five items addressing reported behaviour towards the environment, four of these using a 0–4 rating and one item requiring a yes/no (2/0) response, yielded a total score of 0–18.

As well as the 25 items measuring general environmental orientation, 15 items were developed to address the specific material covered in each program. These items were discussed with the teachers to ensure their face validity and relevance to major learning points incorporated in the lessons. Five items which addressed knowledge of the specific topic, scored as correct or incorrect, yielded a 0–5 scale, and five items which addressed specific attitudes towards the topic, using a 0–4 rating, yielded a total score of 0–20. A further five items which addressed reported behaviour regarding the topic: for 'On the Brink' these consisted of two items using a 0–4 rating and three items requiring a yes/no (2/0) response, yielding a total score of 0–14; for 'Powerwise' the items consisted of four items using a 0–4 rating and one item requiring a yes/no (2/0) response, yielding a total score of 0–18.

Perceptions of level and nature of communications

'aspects of student-parent communication concerning the environment were explored across four dimensions'

Student perceptions of their communication relationship with their parents were measured using formally developed and validated instruments modified to suit the needs of the present research (Bienvenu 1969, Moos & Moos 1981, Weigel & Weigel 1993). These instruments had two foci: student perceptions of the quality of communication with their parent(s); and a measure of their satisfaction with this communication. Each instrument consisted of five items rated on Likert scales. Students were also asked to indicate the frequency of general communication with their parent(s) using a five-point scale. Thus, in total, 11 items were used to measure students' perceptions of general family communication.

In addition, aspects of student-parent communication concerning the environment were explored across four dimensions. These dimensions were selected from the six dimensions of student-parent communication developed by Noller & Bagi (1985) and were adapted to concentrate specifically on discussion regarding the environment. The dimensions included were: frequency (how often environmental issues are discussed in the home—scale 0–4); listening (the extent to which students perceived that their parents listened to them when discussing the environment—scale 0–3); disclosure of feelings (the extent to which students perceived that they were able to express their true feelings and views in discussing the environment—scale 0–3); and satisfaction (the extent to which students were satisfied with their family's discussion about the environment—scale 0–3). Both students' and parents' perceptions of intra-family communications were measured along these dimensions, students by means of the post-program questionnaire and parents by means of telephone interviews.

Student responses to the programs

Four open-ended questions were used to ascertain student responses to each environmental education program. These questions were: 'How much did you like the program?', 'How much did you learn from it?', 'How useful do you think the program was to your own life?', and 'Do you think you have changed in some way as a consequence of the program?' In relation to the 'On the Brink' program these questions were asked informally of the whole class. In relation to the 'Powerwise' program they were included on the post-program questionnaire, using a five-point rating scale. While the former technique provided information of interest, it did not provide numerical data permitting later analysis.

Teacher interviews

The teacher interview involved a semi-structured schedule of questions regarding their perceptions of the effectiveness of the program and any problems or constraints they experienced.

Data analysis

Variables relating to student responses to the program, students' general and topic-specific environmental orientation, parents' general and topic-specific environmental orientation, and family communication as well as teacher/student perceptions regarding the programs were used descriptively to characterise and compare the two programs. Differences between pre- and post-program scores relating to topic-specific knowledge, attitudes and behaviour were tested statistically within each program using the Wilcoxon paired-comparison test (Statistical Package for the Social Sciences, see Norusis, undated). Data regarding the intergenerational communication stimulated by each program were analysed quantitatively—the frequency of communication—and qualitatively—the nature of communication. The relationships between the four sets of variables listed above and the reported frequency of intergenerational communication were investigated using data pooled across the two programs. Students were divided into two groups: those who discussed the program with their parent(s); and those who did not. The differences between these groups' scores on the various measures were investigated using the Mann-Whitney test for the difference between two means (Statistical Package for the Social Sciences, see Norusis, undated).

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Results

Description of 'On the Brink' Program

An endangered flora and fauna education program and exhibition, 'On the Brink' was produced by a national conservation agency. The program toured Australia in 1996 and was hosted in Brisbane by an Environmental Education Centre for six weeks. The one and a half hour program was conducted twice a day for visiting school groups. The purpose of 'On the Brink' was to familiarise children between kindergarten and Grade 7 with endangered species of Australian flora and fauna. The learning experiences involved in the program included dressing up in costume, watching dramatic performance and dance, listening to stories, and involvement in an interactive quiz game about wildlife conservation. A number of props consisting of murals of Australian outback landscapes, flora and fauna, and animal costumes were used to motivate students. In this way, drama, music, art and dance were combined with environmental issues to provide a program designed to appeal to young children.

Teacher perceptions of 'On the Brink'

As indicated above this program was conducted by touring staff rather than by the class teacher. The two presenters conducting the program felt it had been effective in engendering student awareness of, and familiarity with, endangered animals and plants and threats posed to the survival of these species. They had experienced no problems or constraints in implementing the program.

Student responses to 'On the Brink'

The majority of students were very positive about the program, expressing the view that the program was fun, interesting and 'a chance to get out of school', for example:

I didn't really learn anything but I had fun.

I had fun and learnt a lot.

They particularly liked dressing up, asking questions and listening to other students talk about the endangered animal they had been assigned. During class discussion after the program none of the students reported that the program had influenced them to change their views or actions in any way, although some students said they were more aware of how endangered some animals were.

Student environmental attitudes re 'On the Brink'

Significant improvements in students' specific knowledge about endangered species between pre- and post-program stages of the research were apparent in the results set out in Table 2. This suggests that the program exerted a positive impact on students' knowledge about endangered species. The fact that there were no statistically significant changes —although a slight decrease—in student attitudes toward endangered species may have been a consequence of students already possessing quite positive attitudes in this area. Rather than resulting in improved reported behaviour towards endangered species, the program appeared to produce a decline, albeit a statistically insignificant one. This finding is puzzling and needs further investigation. It is possible that as students became more aware, through program material, of what sensitive behaviour towards endangered species actually encompasses, they rated their probable behaviour less positively than before.

Table 2: Comparison of pre- and post-program scores for knowledge about, and attitudes and reported behaviour towards, endangered species

	Pre-program mean scores	Post-program mean scores	Statistical significance of difference between scores*
Attitudes (range 0–20)	15.4	14.7	Not significant
Knowledge (range 0–5)	3.8	4.4	Significant ($p<.01$)
Behaviour (range 0–14)	11.7	9.7	Not significant

* Paired comparisons between pre- and post-program scores were tested using the Wilcoxon test.

Nature and frequency of discussions about 'On the Brink' at home

'discussions were generally initiated by.....children'

Most students (91%) and all parents interviewed reported having discussed the program at home. These discussions primarily consisted of students describing the program and their experience of it to parents. All parents interviewed substantiated this, reporting that discussions were generally initiated by their children. Little conversation regarding the program was actually initiated by parents, with only one asking their child what they had done at school that day. Typically, discussions involved students making comments about how much they had enjoyed the activities and, in some cases, about the animals they had discussed in the program. However, students' participation in the program did not stimulate them to 'teach' their parents something new, nor did it stimulate parents to initiate conversations about it or to seek to elaborate on their child's conversation.

Description of 'Powerwise' Program

'Powerwise' was an environmental education package for Grades 6–7 students produced by the then South-East Queensland Electricity Board, now known as Energex. The package is concerned with electricity—its uses, safety and conservation—and is designed for self-paced instruction. In the program under investigation the package was incorporated into the social studies lesson period over two months. The teacher utilised three different educational

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activities: group discussion regarding ways to save electricity; teacher centred instruction about electricity production and safety: and hands-on work with electric circuits. A homework component included in the program involved students undertaking an electricity safety audit at home with their parents.

Teacher perceptions of 'Powerwise'

In terms of achieving his own teaching goals and students' enjoyment the teacher described the effectiveness of the program as 'only moderate'. The teacher attributed this to the fact that there was not sufficient time available for the program so that students were rushed through various parts of it. Other curriculum areas often took priority over time spent on 'Powerwise'. Another problem was that the homework component was completed by only half of the class. The teacher attributed this to students' perceptions that it was not important to complete this homework, and to the lack of time to assist with homework experienced by parents, many of whom were working single mothers. Despite this the teacher thought that students had enjoyed parts of 'Powerwise', especially making an electric circuit and participating in group discussions regarding how to conserve electricity at home.

Student responses to 'Powerwise'

'Comments were generally negative'

The majority of the class reported little interest in the program with 74% of students stating that they liked the program 'not much' or 'a little' Comments were generally negative, for example:

If I already know about saving electricity, then why do I have to be told twice.

I didn't learn anything at all.

I don't need to learn about it, because I already know what is the right thing to do.

I didn't like being lectured for hours because it gets boring after a while.

Students indicated that they understood 'all' or 'most' of the information in the program (65%) and that at least 'some parts' or even 'most' parts of the program were useful to their life (65%). After the program they thought they would 'know what to do in an emergency' and in relation to electricity safety at home. The components of the program which students reported enjoying involved discussion with their teacher about ways to conserve energy as well as making an electric circuit.

While most students were not enthusiastic about the program they were evenly divided in terms of their feelings about whether the program had made them want to change their behaviour in some way with 43.5% indicating that it had and 56.5% stating either that they had not changed or that they already behaved in an energy sensitive manner. As one student stated, 'I already am power-wise'. Those who thought they had changed in some way stated, for example:

Since I've studied electricity, I and my whole family have been trying to save power.

We had a double-adapter with three outlets on it—and now we don't.

I know what to do to save my family and friends in an emergency, as well as my house.

I try to use less electricity so I use less money.

I try to save electricity more than I used to. I also turn off most electrical things in a storm.

Student environmental attitudes re 'Powerwise'

As indicated in Table 3, no significant differences were found between pre- and post-program scores on knowledge relating to energy conservation or on reported behaviour regarding energy conservation, although student comments reported above indicate that some learning and change had occurred. The program, however, resulted in students' attitudes concerning energy conservation becoming less positive. This finding may be a reflection of students' negative perceptions of the 'Powerwise' program itself or the way in which it was presented.

Table 3: Comparison of pre- and post-program scores for knowledge about, and attitudes and reported behaviour towards, energy conservation

	Pre-program mean scores	Post-program mean scores	Statistical significance of difference between scores*
Attitudes (range 0–20)	11.4	6.9	Significant ($p<.01$)
Knowledge (range 0–5)	2.8	3.0	Not significant
Behaviour (range 0–18)	9.1	9.3	Not significant

* Paired comparisons between pre- and post-program scores were tested using the Wilcoxon test.

Nature and frequency of discussions about 'Powerwise' at home

The nature of discussions at home about the 'Powerwise' environmental education program concerned either:

- electricity safety and conservation behaviour, or
- homework related to the program.

As shown in Table 4 relatively few conversations concerning these issues were generated in the home when compared with those generated from the 'On the Brink' program. All discussions concerning electricity safety and conservation

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were initiated by students. For instance, some students reported:

I told my parents about power points and things in the kitchen.

I told my family to use electricity for a shorter amount of time, and also use less water.

'the program appeared to have had some success in influencing parent behaviour'

Home discussions on electricity safety were initiated as a result of homework set from the program. This homework involved students conducting an electricity audit of their home. Four of the five parents who had said they talked about the program at home, indicated it was initiated by the homework activities. Importantly, the program appeared to have had some success in influencing parent behaviour. One parent reported that helping to complete the electricity safety audit had provided important learning regarding energy conservation and that the household's practices had been changed as a consequence. Another parent reported being informed by their child that their household's particular practices in using electricity powerboards should be changed, as a consequence of the child having completed the audit.

Factors affecting intergenerational communication

In the analyses reported in the discussion which follows, a number of factors which may affect intergenerational communication about the environmental education program were explored. These included program specific factors and the following non-program factors—student general environmental knowledge, attitudes and behaviours; parent general environmental knowledge, attitudes, and behaviours; and family communication properties. For the purpose of these analyses students' self-reporting of the extent of home discussion about either program was reduced to a dichotomous variable: some discussion vs no discussion. The finding of a significant relationship ($\chi 2=3.75$, $p < .05$) between parent and student reports of the presence or absence of discussion about the program supported the validity of the classification based on student reports.

Program specific factors

Information in Table 4 indicates that the two programs differed markedly in the extent to which students reported having discussed the program in their homes, with the 'On the Brink' program being more likely to be discussed than the 'Powerwise' program ($\chi 2=15.01$, $p<.001$, based on students' reports). However, although the frequency of discussion was greater in the case of 'On the Brink', the nature of the discussion emanating from the 'Powerwise' program appeared in some situations to have had a greater impact on parents' behaviour.

Table 4: Reported frequency of intergenerational discussions according to both students and parents

	Number of students who discussed the program	
	'On the Brink'	**'Powerwise'**
Students reporting discussion	20 from 22 (91%)	9 from 23 (39%)
Parents reporting discussion	5 from 5 (100%)	5 from 8 (63%)
Both student and parent reporting	4 from 5 (80%)	1 from 8 (13%)

Some of the differences between the programs which might account for the observed differences in frequency and nature of the discussion engendered include:

- program length: 'On the Brink' was a much shorter, more intense experience, while 'Powerwise' was extended over a two-month period.
- degree of program formality: "On the Brink' took place out of the classroom in an Environmental Education Centre, while 'Powerwise' was part of the formal school program.
- degree of successful completion of program goals: whereas the presenters involved with 'On the Brink' were able to focus exclusively on the program and reported they had achieved the desired outcomes, the teacher presenting 'Powerwise' reported only moderate success, not having had sufficient time within the class curriculum to devote to the program.
- differences in presenters' relationships with students: the presenters of 'On the Brink' were known to the children only through their one and a half hour involvement in the program, while 'Powerwise' was presented by the regular class teacher as part of the school curriculum.
- inclusion of a homework component: the 'Powerwise' program required students to conduct an electricity safety audit at home as part of a homework assignment. No home activities were included in the 'On the Brink' program.
- differences in ages and social backgrounds of the students: 'On the Brink' students were younger and came from more affluent socio-economic areas of Brisbane than 'Powerwise' students who were in their final year of Primary School and tended to come from single parent families.
- students' enjoyment of and learning from the program: most of the students from the 'On the Brink' program reported that they had enjoyed the program while those from the 'Powerwise' program reported that they had not.

Although it was not possible to systematically test the impact of any of the above program elements within the present study, some data supported the idea that student enjoyment of the program influenced the reported frequency of program discussion at home. For example, as shown in Table 5, those

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students who indicated their enjoyment of the 'Powerwise' program and its perceived usefulness and impact on their lives, also talked more frequently about the program at home. There was no association between student perceptions of learning derived from the program and the frequency of discussion of the programs.

Table 5: Difference between 'some discussion' and 'no discussion' groups in terms of student responses to the 'Powerwise' program

	Mean scores for student evaluation of the program			
	Liked program	Learnt something	Usefulness to student	Perception of personal change
Range	(0–4)	(0–4)	(0–4)	(0–2)
Some discussion (n=9)	2.6	2.9	3.0	1.8
No discussion (n=14)	1.3	2.9	1.7	.3
Statistical significance of differences*	Significant (p<.001)	Not significant	Significant (p<.01)	Significant (p<.001)

* Differences between 'some discussion' and 'no discussion' groups were tested using the Mann-Whitney test.

As indicated in the earlier description of method, information regarding student responses to 'On the Brink' was gained through classroom discussions. These data did not allow the same kind of analysis and tabulation as presented above for 'Powerwise'

Non-program factors

'the two programs differed significantly in terms of the intergenerational discussion engendered'

Analyses involving non-program factors were performed by pooling the data across the two programs. However, as set out in Table 4, the two programs differed significantly in terms of the intergenerational discussion engendered. This introduced the problem of whether any differences observed in relation to the presence or absence of discussion were due to non-program factors or program specific factors. In interpreting the results for the pooled data, therefore, any statistically significant difference between the 'discussion' and 'no discussion' groups was verified by reference to corresponding differences within the individual programs. If the individual program results did not support the direction of the findings from the pooled data on any test, then that test result was discounted in the analysis. Findings of statistically significant relationships between presence/absence of discussion and other variables do not, of course, necessarily indicate causation. The findings are reported as a means of generating hypotheses which further research must test systematically.

Student factors

The results of analysis of student environmental orientation scores according to reported discussions of the environmental programs are presented in Table 6. Students' mean scores on general behavioural intentions and reported behaviours were significantly higher amongst students who discussed the program at home. Although a significant difference between students who did and did not discuss the program at home was initially suggested in relation to students' general attitudes towards the environment, this difference was discounted on the basis of the analytical procedure described above. No significant difference between groups was evident in relation to general environmental knowledge. These findings suggest that an hypothesis for future investigation is that the extent to which students are willing to act in relation to environmental issues may be an important factor in stimulating student conversations about these matters with their parents.

Table 6: Differences between 'some discussion' and 'no discussion' groups in terms of students' general environmental orientation

	Mean environmental attitude, knowledge, and behaviour scores			
	Attitudes	Knowledge	Behavioural intentions	Reported behaviour
Range	(0–20)	(0–10)	(0–20)	(0–18)
Some discussion (n=29)	13.9	5.0	15.7	13.9
No discussion (n=16)	11.0	4.2	11.7	10.6
Statistical significance of differences*	Significant (p<.05)	Not significant	Significant (p<.001)	Significant (p<.01)
Verification in individual programs	Discounted		Verified	Verified

* Differences between 'some discussion' and 'no discussion' groups were tested using the Mann-Whitney test.

Parent factors

The presence or absence of discussion about the two programs at home was not found to be associated with parent general environmental attitudes, knowledge or behaviour. This is not surprising given that it was the students who initiated discussions based on their program experiences and assigned homework tasks. This suggests that how parents think, feel and act toward the environment may have a limited impact on the likelihood that students will initiate discussion at home about environmental programs experienced at or in association with school.

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Family communication factors

As set out in Table 7 significant relationships were evident between student reports of the frequency of general and environmental communication and the occurrence of discussions about the programs. This suggests that, not surprisingly, students who talk to their parents in general and concerning environmental issues are also more likely to initiate communication about environmental programs than those who do not often talk to their parents.

Table 7: Differences between 'some discussion' and 'no discussion' groups in terms of frequency of family communication

	Frequency of student-parent communication	
	General communication (range 0–4)	On environmental issues (range 0–4)
Some discussion (n=29)	3.2	2.2
No discussion (n=16)	2.4	1.2
Statistical significance of differences*	Significant (p<.01)	Significant (p<.01)
Verification in individual programs	Verified	Verified

* Differences between 'some discussion' and 'no discussion' groups were tested using the Mann-Whitney test.

The information in Table 8 indicates that students who talked about the program also perceived the quality of their communication with their parents to be better than those who did not talk about the program.

Table 8: Differences between 'some discussion' and 'no discussion' groups in terms of family communication factors

	General family communication		Aspects of communication about environmental issues		
	Quality of	Satisfaction	Listening	Disclosure	Satisfaction
Range	(0–20)	(0–20)	(0–3)	(0–3)	(0–3)
Some discussion (n=29)	15.4	10.9	2.3	2.2	2.1
No discussion (n=16)	11.6	14.9	1.4	1.3	1.4
Statistical significance of differences*	Significant (p<.001)	Significant (p<.01)	Significant (p<.01)	Significant (p<.05)	Significant (p<.05)
Verification of individual programs	Verified	Discounted	Verified	Verified	Verified

* Differences between 'some discussion' and 'no discussion' groups were tested using the Mann-Whitney test.

Similarly, students who talked about the program at home also tended to rate their past discussions about the environment—in terms of the extent to which their parents listened to them; their ability to express their true feelings in discussion; and their satisfaction with their family's discussion about the environment—more positively than those students who did not talk about the program at home.

Conclusions and implications

This paper has highlighted some of the factors which may facilitate intergenerational communication and learning in the home. Because of the relatively small sample involved the findings of this pilot study should be interpreted as tentative hypotheses which need to be tested more systematically through further research.

Ideas which emerge from the data collected in relation to the 'On the Brink' program suggest that environmental awareness programs which are interesting and fun will influence young people to initiate discussion about them at home. Simply enjoying a program, however, is clearly not enough if the aim of environmental education programs is to promote goals of environmental learning, critical thinking and environmental action. The 'On the Brink' program was not designed to have an impact on students' parents and the material and delivery were clearly aimed at young learners. Accordingly, it is not surprising to find that even when students discussed the program at home parents for the most part reported that they did not gain anything of meaning and relevance to their own views and life.

'messages contained in environmental education programs could be enhanced so that parents might learn from discussions with their children'

If environmental educators wish to provide students with learning experiences which may have relevance to the students' parents or caregivers then more attention needs to be given to the kinds of messages made available through such programs. It is possible that messages contained in environmental education programs could be enhanced so that parents might learn from discussions with their children. In this way, parents would have the opportunity to become more aware of environmentally related issues and ways of acting to resolve these. The aim would not be to coerce parents to adopt any particular beliefs or practices but rather to become better informed through such intergenerational discussion.

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'programs need to incorporate student actions which have the potential to involve parents as partners in student-centred activity in the home'

Data collected about the 'Powerwise' program suggest that one way to encourage student and parental environmental communication and action in the home is by designing programs that focus on tangible targets for action. Evidence from the program's effects on student-parent communication suggested that students did initiate discussion about energy conservation actions at home. One component of this environmental program which appeared to serve as an effective strategy to promote intergenerational discussion was the setting of homework. A key suggestion which emerges for educators seeking to facilitate student-parent discussions at home is that programs need to incorporate student actions which have the potential to involve parents as partners in student-centred activity in the home. For this to be successful, educators need to carefully consider the design and nature of home exercises to ensure that they provide for students and parents learning experiences which are appealing and informative.

This preliminary study suggests that three main groups of factors influence the occurrence of discussions between students and their parents:

- *students' response to the program*, including students' enjoyment of the program and their perceptions of the program's impact on their lives
- *students'* general environmental orientation, in particular, their behavioural intentions, and
- *family communication factors*, including the extent of general communication and communication concerning environmental issues in the home, and student perceptions of the quality of family communication.

The suggestions which emerge are that students are more likely to discuss a program if:

- they have enjoyed it
- they have a desire to do things to help the environment, and
- they report general discussion with their parents which is frequent and of a high quality.

While the above factors may be associated with the frequency of discussions about environmental education programs at home other factors may be involved in influencing the nature of those discussions. For example, students may discuss the program in more life-changing ways when the material is related to practical behaviours in the local environment and around the house. Students reported that they enjoyed sharing with their parents new information and skills about conserving energy and ways of economising around the home. Homework which involves students and parents working together has potential for stimulating productive intergenerational discussion. If the suggestions emerging from this preliminary study are confirmed and extended by future investigations then environmental education programs which are well structured and focused with regard to the ideas raised above hold much promise for facilitating intergenerational communication between young people and their caregivers—and, possibly, enhanced learning and more effective environmental action.

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