

Pre-school Environmental Education in Hong Kong: An Exploratory Study

John Chi Kin Lee

Department of Curriculum & Instruction,
The Chinese University of Hong Kong

A B S T R A C T

This paper reports on an investigation of the status of pre-school environmental education in Hong Kong through both a questionnaire survey and case studies. The study looked in particular at the environmental education activities organised, difficulties encountered in the implementation of environmental education and teachers' attitudes towards environmental education and teaching approaches. The findings indicated that pre-school environmental education tended to focus more on education *about* the environment than education *in* and *for* the environment. The results also revealed that the teachers' perceived barriers were mainly *logistical*, such as lack of time and resources, and *educational* in the sense that they felt that they lacked knowledge about environmental education. The implications for future development of environmental education are discussed.

Introduction

The pre-school years are crucial to the formation of environmental knowledge, attitudes and behaviours. Environmental knowledge and attitudes learned during these years are hard to alter (Tilbury 1994). In face of the deteriorating quality in the environment in Hong Kong, environmental education has become an increasingly important item on the educational agenda. Recently, the Hong Kong SAR Government Education Department issued revised Guidelines on Environmental Education in Schools incorporating the notion of sustainability. Although there have been some research studies on environmental education in primary and secondary schools in Hong Kong (e.g., Lai & Stimpson 1997, Lee 1997), there is still a dearth of research on environmental education in pre-schools in the local context. This study aims to fill this gap by studying the status of environmental education in pre-schools through a questionnaire survey and case studies.

Background to the study

During the 1990s, a new orientation in environmental education focusing on the promotion of 'sustainability' emerged (Tilbury 1995a, Huckle & Sterling 1996). These authors and others (e.g., Gough, A. 1997, Gough, N. 1992, Tilbury 1995a, Sterling 1990) hold that education for sustainability should adopt a holistic, three-fold approach to environmental education, namely education *about*, *in* and *for* the environment. Education *about* the environment, known as the 'head' approach, emphasises the development of environmental awareness, knowledge and understanding. In such an approach, ecological concepts and technical solutions to environmental problems are addressed. Education *in* the environment, the 'heart' approach, usually encourages outdoor activities that afford personal experience within the environment as well as pupil-centred and activity-based learning. Education *for* the environment, the 'hand' approach, entails active participation in solving environmental problems (Lee 1998, Tilbury 1995b).

The implications of this tripartite approach were embedded in the current and revised versions of 'Guidelines on Environmental Education'. In 1994, a document entitled 'Kindergarten Environmental Education: Reference materials'

was issued by the Curriculum Development Institute, Education Department. In this document (Curriculum Development Council 1994, p. 2), the objectives of environmental education, in line with the previously issued 'Guidelines on Environmental Education in Schools' (Curriculum Development Council 1992, p. 9), were expressed as follows:

To help pupils to:

- (a) appreciate and love nature;
- (b) develop an ethic of respect and responsibility for the environment;
- (c) acquire knowledge and develop attitudes and skills that will enable them to participate in protecting and improving the environment;
- (d) develop a lifelong commitment to environmental sustainability and protection;
- (e) develop a holistic understanding of all aspects of environmental problems at local and global levels as a basis for solving them;
- (f) form environmentally friendly behaviour and lifestyles that are conducive to the sound management of the environment; and
- (g) realise that Hong Kong has a responsible role to play in the world community in solving regional and global environmental problems.

In particular, the document (Curriculum Development Council 1994, p. 3) stipulates that the objectives of environmental education for kindergarten are to:

- (a) enhance children's understanding of and concern for the environment;
- (b) deepen children's appreciation for the natural environment;
- (c) encourage children's wise use of resources; and
- (d) foster children's positive attitudes towards protecting the environment.

The revised 'Guidelines on Environmental Education in Schools (Draft)' (Curriculum Development Council 1999) suggest that when planning and conducting environmental education activities at pre-primary level, attention should be paid to the following basic principles (pp. 19-20):

- children should be guided to observe and appreciate in person the beauty of nature and the importance of conserving the environment;
- various components of environmental education should be integrated into different themes and activities; and
- the main emphasis of teaching should be the development of interests and positive attitudes of children towards the environment.

In view of the importance of environmental education in early childhood education and the dearth of research in Hong Kong, this study aims at investigating the status of environmental education in pre-schools in the local context with particular reference to the environmental education activities organised, difficulties encountered in the implementation of environmental education and teachers' attitudes towards environmental education and teaching approaches. The study is partly based on Fullan's (1991) analysis of educational change. Fullan shows that the implementation of an innovation such as environmental education is affected by factors such as resources and the practicality of the innovation. These factors tend to shape implementation, content and the organisation of activities.

Research methods

The present study was divided into two phases. The first phase involved a survey consisting of two questionnaires, both of which were adapted from existing questionnaires. One questionnaire focused on the status of environmental education (Stimpson *et al.* 1993) and covered the following areas:

- kindergarten's background information
- implementation of environmental education as reflected through such issues as :
 1. leadership for environmental education (teacher or committee)
 2. themes introduced for environmental education
 3. circulation and discussion of 'Kindergarten Environmental Education: Reference materials' (Curriculum Development Council 1994)
 4. purchase of environmental education books or materials
 5. practices adopted for saving electricity and water
 6. green practices adopted in consumerism (e.g., using low pollution products)
- environmental education activities organised in 1997-98 and 1998-99
- factors inhibiting the implementation of environmental education in school

The items of both questionnaires were translated into Chinese and checked by a group of Kindergarten practitioners and teacher educators to ascertain the clarity of format and content of the questionnaires. The two questionnaires were then piloted and adjusted. Cronbach Alpha values of EET, EEA, BA, EMP, PTA and CTA based on the survey data were found to be 0.9084, 0.8289, 0.8095, 0.8555, 0.8170 and 0.7637 respectively, indicating that the reliabilities of the sub-scales were satisfactory. Convenience sampling was adopted for this study. Altogether, about 2200 questionnaires were sent out to 150 kindergartens. More than 1100 pre-school teachers from 101 kindergartens participated in the questionnaire survey. The overall response rate was considered to be acceptable.

In the second phase, a total of eight kindergartens - three high, two medium and three low-scoring schools in terms of the average scores they had for the extent of environmental education (EET) - were chosen for case studies, using interviews and documentary review as the research methods. The aims of the case studies were to illuminate and supplement the survey findings. The interviews focused on the following aspects: (a) the kind of environmental education activities organised in pre-schools; and (b) the difficulties encountered in their implementation of environmental education. Altogether, five principals, four senior teachers and twenty-six teachers were interviewed. Semi-structured interviews, each of which took about thirty-five minutes, were tape-recorded and transcribed verbatim. The interviews were conducted in Cantonese. The quotations below have been

Another questionnaire included items on the following areas:

- the extent of teaching of environmental education (EET) (Lee & Ma 1996) through asking respondents to indicate a value from 1 (did not implement at all) to 7 (frequently implemented) on a range of issues and attitudinal focuses;

translated into English. Data were analysed in an inductive, ongoing cyclical process in which categories and patterns emerged from the data (Miles and Huberman, 1994). The results were checked and commented on by another colleague.

Findings

Survey findings

With regard to institutional commitment to the promotion of environmental education, the survey findings showed that the majority of kindergartens in Hong Kong did not have a coordinator (83.1% of the kindergartens) or a committee (96.7% of the kindergartens) to take charge of environmental education. About half (58.2%) of the kindergartens had circulated the document: 'Kindergarten Environmental Education: Reference materials', but only 5.5% of the schools had discussed it.

More than half of the schools (70.7%) organised either an environmental week or an environmental protection day. 56.9%, 53.7% and 72.7% of the schools respectively used the special themes of 'nice school environment', 'ideal living environment' and 'healthy food' to implement environmental education. 73.0% of the schools had purchased books and instructional materials related to environmental education.

The findings also revealed that 92.3% of the schools had practised reduction in water and electricity consumption. Furthermore, about half (55.6%) of them had adopted green practices in consumerism, such as using low pollution products.

Table 1 Environmental education activities organised by pre-schools

Environmental education activities	September 1997 – August 1998	September 1998 – August 1999
1 Visits to the urban parks (e.g., the Hong Kong Zoological and Botanical Gardens and Hong Kong Park)	57.1%	46.2%
2 Visits to country parks	51.6%	39.6%
3 Visits to the Mai Po Marshes and Kadoorie Farm	8.8%	17.6%
4 Talks, slides or video presentations related to the theme of environmental protection	29.7%	25.3%
5 Board display or exhibitions related to the theme of environmental protection	41.8%	34.1%
6 Competitions (e.g., environmental slogan or poster design)	4.4%	11.0%
7 Waste paper and old commodities collection	45.1%	38.5%
8 Exchange of books and toys	24.2%	23.1%
9 Tree planting, participation in community activities (e.g., cleaning the beach)	6.6%	11.0%
10 Rearing small animals	26.4%	26.4%
11 Growing plants and greening the environment	59.3%	42.9%
12 Using waste products to make decorations, beautifying the classroom and the school	79.1%	62.6%
13 Cleaning the classroom and school environment	72.5%	52.7%

With regard to the organisation of environmental education activities, the following activities appeared to be most popular (Table 1):

- using waste products for making decorations, beautifying the classroom and the school (79.1% and 62.6% of the schools for 1997-98 and 1998-99 respectively)
- cleaning the classroom and school environment (72.5% and 52.7% of the schools for 1997-98 and 1998-99 respectively)
- growing plants and greening the environment (59.3% and 42.9% of the schools for 1997-98 and 1998-99 respectively)
- visiting the urban parks (e.g., Hong Kong Park) (57.1% and 46.2% of the schools for 1997-98 and 1998-99 respectively)
- visiting country parks (51.6% and 39.6% of the schools for 1997-98 and 1998-99 respectively)

Table 2 Extent of teaching of environmental education (EET)

Category of environmental education	Mean (max. score = 7)	S.D.
1 Cultivating pupils' appreciation of the natural environment	4.92	1.32
2 Helping pupils understand the adverse impact of pollution on the environment	4.92	1.36
3 Suggesting pupils to cultivate positive habits of protecting the environment and ways of consumption	4.89	1.33
4 Cultivating pupils' aesthetic awareness of environmental stimuli (e.g., sounds, smell, colours and etc.)	4.74	1.38
5 Inviting parents to participate in environmental protection activities (e.g., planting flower-pots, helping collect waste to make craft)	4.15	1.75
6 Helping pupils understand that humanity is part of the natural world	4.15	1.51
7 Stimulating pupils' interest towards the surroundings through activities such as visits to the zoo and parks	4.07	1.55
8 Helping pupils learn environmental issues through group discussion	3.75	1.39
9 Improving pupils' learning of environmental issues by using instructional media (e.g., recording and video)	3.51	1.53
10 Helping pupils learn environmental issues through role-playing and activities such as dramas	3.41	1.52
11 Organising pupils to participate in beautifying and greening the school environment	3.30	1.63
12 Improving pupils' learning of environmental issues by using experiments	3.20	1.57
13 Allowing pupils to observe and analyse local environmental issues through fieldwork	3.08	1.60
14 Helping pupils know how to participate in public environmental protection affairs (e.g., writing letters to environmental protection department)	2.56	1.56
15 Organising pupils to participate in community environmental protection activities (e.g., planting trees, cleaning beaches, and etc.)	2.34	1.54
16 Inviting parents to help children undertake home survey (e.g., checking the amount of using electricity and water)	2.22	1.47

In contrast, the following activities appeared to be least popular (Table 2):

- competitions (e.g., slogan and poster) (4.4% and 11.0% of the schools for 1997-98 and 1998-99 respectively)
- planting and participating in community activities (e.g., cleaning the beach) (6.6% and 11.0% of the schools for 1997-98 and 1998-99 respectively)

- visiting the Mai Po Marshes and Kadoorie Farm (8.8% and 17.6% of the schools for 1997-98 and 1998-99 respectively)

Table 2 shows the extent of teaching of environmental education. It was found that the following activities tended to be more frequently implemented:

- cultivating pupils' appreciation of the natural environment (mean score = 4.92)
- helping pupils understand the adverse impact of pollution on the environment (mean score = 4.92)
- getting pupils to cultivate positive habits for protecting the environment and better consumer habits (mean score = 4.89)
- cultivating pupils' aesthetic awareness of environmental stimuli (e.g., sounds, smell, colours and etc.) (mean score = 4.74)

In contrast, the following activities tended to be less frequently implemented:

- inviting parents to help children undertake a home survey (e.g., checking the amount of electricity and water used) (mean score = 2.22)
- organising pupils to participate in community environmental protection activities (e.g., planting trees, cleaning beaches, and etc.) (mean score = 2.34)
- helping pupils know how to participate in public environmental protection affairs (e.g., writing letters to environmental protection department) (mean score = 2.56)

Table 3 Teachers' perceptions of difficulties in promoting environmental education

Category of barriers (responded by teachers) Item (maximum score = 7 meaning very strong agreement)	Mean (n=1130)	S.D.
I do not have adequate class time.	4.43	1.53
School does not have enough instructional materials and resources.	4.17	1.47
I do not have adequate knowledge in teaching issues related to environmental education.	3.97	1.33
There are some topics more important than environmental education that need to be taught.	3.68	1.43
I do not have adequate time for lesson preparation.	3.60	1.50
The environment surrounding the school is not suitable for implementing environmental education activities.	3.30	1.47
Colleagues lack interest in teaching issues related to environmental education.	3.11	1.38
Pupils are not interested in environmental education.	2.92	1.38
I am not interested in teaching issues related to environmental education.	2.59	1.37

In the survey, teachers highlighted a number of obstacles to the promotion and implementation of environmental education. As shown in Table 3, the following were seen to be relatively serious:

- inadequate class time (mean score = 4.43)
- insufficient instructional materials and resources (mean score = 4.17)

- inadequate knowledge for teaching about environmental education (mean score = 3.97)

The senior teachers or teachers in-charge-of environmental education perceived the following to be relatively serious difficulties at the school level (Table 4):

- heavy teacher workload (mean score = 2.26)
- lack of instructional materials on environmental education in school (mean score = 2.14)
- lack of manpower in school to arrange outdoor learning activities (mean score = 2.13)

Table 4 Difficulties in promoting environmental education at the school level

Category of barriers (at the school level) (Maximum score is 3 meaning a serious barrier)	Mean (n=91)	S.D.
Teacher workload is heavy.	2.26	0.60
School lacks instructional materials on environmental education.	2.14	0.64
School lacks manpower to arrange outdoor learning activities.	2.13	0.73
School lacks clear environmental education policy and objectives.	2.08	0.68
Teacher lacks training in environmental education.	2.06	0.46
Teacher lacks motivation to implement environmental education.	2.03	0.61
The curriculum content is tight, lacking time to teach environmental education.	2.01	0.63
School lacks financial resources.	1.88	0.74
Timetable lacks flexibility.	1.79	0.60
Pupils are not interested in environmental education.	1.38	0.55

In contrast, the respondents felt that the following were less serious:

- teachers not interested in teaching issues related to environmental education (Table 3 mean score = 2.59)
- pupils not interested in environmental education (Table 3 mean score = 2.92 and Table 4 mean score = 1.38)
- lack of flexibility in the timetable (Table 4 mean score = 1.79)
- lack of financial resources in the school (Table 4 mean score = 1.88)

Survey findings also showed that teachers had relatively high levels of concern about environmental issues (mean score = 4.91) and personal interest in environmental education (mean score = 4.92). In comparison, they had lower levels of understanding of environmental issues, (mean score = 4.39) and of active involvement in them (mean score = 4.32) (Table 5). Teachers felt that the following aspects were relatively important or essential in the context of the kindergarten curriculum (Table 6):

- children's responsibility in protecting the environment (mean score = 6.01)
- children's aesthetic appreciation of the natural environment (mean score = 5.83)

Table 5 Personal views of environmental education (EEA)

Items (1 meaning very low and 7 meaning very high)	Mean	S.D.
My concern about environmental issues is	4.91	1.04
My understanding of environmental issues is	4.39	0.97
My interest in environmental education is	4.92	1.06
My involvement in personal action in environmental issues is	4.32	1.12

However, they regarded aspects such as 'environmental ethics' (mean score = 4.99) and 'awareness of environmental issues in other countries' (mean score = 4.11) to be only of moderate importance in the curriculum (Table 6).

Table 7 shows that teachers tended to use and prefer a very child centred approach (mean scores of 2.84 and 2.39) with a strong emphasis on collaborative group activities (mean scores of 2.57 and 2.37) in the teaching of environmental education. In addition, they tended to use and prefer a strong emphasis on skills (mean scores of 4.27 and 4.01). However, there were discrepancies between the current and preferred teaching approaches. Greater discrepancies were detected in the dimension of 'strong emphasis on process versus strong emphasis on knowledge' while smaller discrepancies were found in such aspects as 'strong emphasis on collaborative group activities versus strong emphasis on competitive activities'. (Table 7)

In addition to descriptive statistics, multiple regression analysis revealed that the following factors were significantly associated with the extent of teaching of environmental education (EET) (Table 8):

- personal views of environmental education (EEA)
- emphasis on environmental education in the curriculum (EMP)
- discrepancy between preferred (PTA) and current teaching approach (CTA)
- interaction between preferred (PTA) and current teaching approach (CTA)

It is noteworthy that the discrepancy between preferred (PTA) and current teaching approach (CTA) is a negative predictor of the extent of teaching of environmental education (EET). This suggests that the greater the discrepancy, the lower the extent of teaching of environmental education.

Interview findings from the case studies

It happened that eight kindergartens in the second phase of the study were located in different parts of Hong Kong. Five of them were situated in the city area whilst the others were in the New Territories. One of them was privately run whilst the rest of them were managed by different sponsoring bodies. In each school, about three to five teachers, including the principal or the senior teacher, were interviewed.

(a) Environmental education activities organised in pre-school

All eight kindergartens had organised activities in conjunction with the parents to help collect waste for craft work. This is to a certain extent consistent with the survey findings that kindergartens tended frequently to 'invite parents to participate in environmental protection activities' (Table 2; mean score = 4.15, rank = 4). In some cases, parents were also invited to do craft work with their children. In a school with higher scores regarding the extent to which environmental education was taught (School B), some parents used seashells, tree branches, egg shells, unused buttons and cans to make a flower basket, while others used waste to make Christmas decorations. Parents were also involved in the assessment of craft work. In another school with higher scores regarding the extent to which environmental education was taught (School F), parents were invited to participate in an environmental clothing-design competition using plastic bags, newspapers and scraps of cloth to make dresses, jackets and ties.

Table 6 Emphasis on environmental education in the kindergarten curriculum (EMP)

Aspects of environmental education (1 meaning unimportant and 7 meaning essential)	Mean	S.D.
Children's responsibility in protecting the environment	6.01	1.21
Knowledge and understanding of environmental concepts (e.g., recycling and biological diversity) and environmental issues	5.08	1.39
Environmental ethics (interaction and interdependence between people and environment)	4.99	1.43
Awareness of local environmental issues	5.06	1.31
Awareness of environmental issues in other countries	4.11	1.47
Children's aesthetic appreciation of the natural environment	5.83	1.22

In addition to craft work using waste products, some schools organised activities such as collecting and sorting waste into different categories. For example, school D provided a box for parents to deposit their home waste paper and cans, while school G put out three large collection bins for paper, plastic bottles and aluminium cans respectively. In school E, teachers drew pictures of different kinds of waste, and children were asked to classify different waste products such as glass bottles, paper and soft drink cans and to state which of them could be recycled.

Most of the kindergartens studied did not frequently organise outdoor environmental education activities or picnics. Some of them organised three outings a year for each grade, with one of them accompanied by parents. They usually visited urban parks, countryside parks and natural trails. This accords with the survey results showing that visiting the Mai Po Marshes and Kadoorie Farm were less popular activities whilst visiting urban parks and country parks were more popular ones. In one of the pre-schools with higher scores regarding the extent to which environmental education was taught (School B), children were asked to use bags to collect their rubbish during a picnic and then put the bags into a rubbish bin, so as to help cultivate the concept of 'keeping the countryside and park clean'. In another school, a picnic outside the school was organised and a competition was arranged to encourage children to produce as little waste as possible from

the food they brought with them (School H). For school E, children were asked to draw pictures of the urban park.

Table 7 Current and preferred teaching approach to teaching of environmental education (CTA and PTA)

Items (lower values mean moving towards a more progressive orientation and higher values mean moving towards a more traditional orientation) (Maximum score = 7)	Current teaching approach (CTA)		Preferred teaching approach (PTA)	
	Mean	S.D.	Mean	S.D.
very child centred versus very teacher centred	2.84	1.47	2.39	1.44
strong emphasis on process versus strong emphasis on knowledge	3.76	1.52	3.17	1.65
strong emphasis on values versus strong emphasis on skills	4.27	1.41	4.01	1.74
teacher as a facilitator of learning experiences versus teacher as a transmitter of knowledge	3.49	1.64	3.07	1.68
learning dominated by discovery versus learning dominated by indoctrination	3.38	1.59	2.95	1.68
strong emphasis on collaborative group activities versus strong emphasis on competitive activities	2.57	1.46	2.37	1.47

Some pre-schools encouraged their pupils to take part in growing plants. For example, School A gave seeds to children to grow at home, whilst school H invited children to bring a flowerpot to school to grow plant seedlings. School G had a small seedbed where different classes grew beans. The teacher gave the children an exercise book in which they could make observations about plant growth and draw pictures of the seedlings.

With regard to teaching methods, many teachers used the closed question and answer technique or direct instruction to get over environmental concepts such as 'save water and energy', 'avoid throwing rubbish', 'using more handkerchiefs and less tissue paper', 'using less detergents and soaps' and 'stop picking flowers'. Very often teachers would use storytelling with the aid of photographs and pictures to explain environmental issues. For example, one teacher discussed the value of people using vehicles less. She then used a picture to ask: 'Why do people cover their noses?' The children answered: 'It's because the car exhaust stinks' (School H). Some teachers used tape recordings to give the children an impression of noise when they talked about noise pollution (School A and C).

In addition, some teachers used role-playing activities or games to teach environmental concepts such as environmental cleanliness and deforestation. For example, children were asked to act as naughty children and make the surroundings dirty. Then some children would act as mothers and point out what was wrong (school C). In another school, a child would act as a lumberjack whilst another child would act as a tree planter. Other children acting as trees would form a circle and when the tree planter came around, the children would stand up. When the lumberjack came around, the children would lie down. Through the activity, children were involved in thinking about some of the effects of human activities such as logging (School B).

Some teachers (school F) took their pupils to nearby rubbish collection stations and parks to experience different environments and then asked them to choose which environment they preferred. The kindergartens being studied, however, paid little attention to community environmental education activities. The only exceptions were school G, where an activity known as 'cleaning the beach' was organised for senior kindergarten pupils in collaboration with their parents, and school E where children helped pick up the rubbish in the nearby housing estate.

(b) Barriers encountered in the implementation of environmental education

The survey findings revealed that at the school level, heavy teacher workload was seen as a serious difficulty affecting the implementation of environmental education. At the teacher level, inadequate class time and inadequate knowledge in environmental education were seen as obstacles. Moreover, at both the school and teacher levels, lack of instructional materials and resources was perceived as a constraint for the promotion of environmental education. The case studies revealed similar findings, but identified a further constraint – lack of parental support.

Table 8 Results of multiple regression analysis: Factors associated with the extent of teaching of environmental education (EET)

Dependent variable	Selected Independent Variables in Regression Equation	B	Beta	t-value
Extent of teaching of environmental education (EET)	Personal views of environmental education (EEA)	0.339	0.297	9.653***
	Emphasis on environmental education in the curriculum (EMP)	0.154	0.164	5.232***
	Discrepancy between preferred (PTA) and current teaching approach (CTA)	0.125	-0.113	3.824***
	Interaction between preferred (PTA) and current teaching approach (CTA)	0.000	0.067	2.233*

Multiple R = 0.403 R Square = 0.163
2-tailed significance * p < 0.01 ** p < 0.001 *** p < 0.0001

Time

Case studies showed that teachers had problems such as heavy workload and inadequate class time for implementing environmental education. Many kindergartens in Hong Kong were bi-sessional, with each session having only three hours for teaching every day. As some teachers said:

The curriculum is packed...with many activities. Everyday the children have three hours. Our assignments are urgent and we have to take care of a lot of things. (Teacher interview, school B)

You have only three hours for doing assignments, teaching, musical activities, physical activities...many things. In fact, it is very hectic. So if environmental education is to be promoted, I feel that we need time...If there is not enough time...there will simply be pres-

sure (on the children) and the emphasis will be on the product instead of the process. (Teacher interview, school D)

The knowledge base of teachers

Some teachers feel that they do not have adequate environmental knowledge for the teaching of environmental education.

When we have discussion, we find that we do not have adequate environmental awareness. Teachers should first learn about this, acquire a good knowledge base, so that pupils can benefit. (Teacher interview, school C)

I think the most important thing is that we need to have more knowledge about environmental education...It is because we do not have a deep understanding of this, and there are not enough channels for us to find out about it. (Teacher interview, school D)

Resource provision

Some teachers felt that there was inadequate information and not enough instructional materials for teaching environmental education.

The school does not have instructional materials on environmental protection. We have only one set of textbooks and few associated teaching aids. (Teacher interview, school E)

(The Education Department and environmental organisations) should provide more environmental information for teachers, so as to let them collect more relevant information and design different activities. (Teacher interview, school G)

Parental support

In addition to these constraints, some teachers claimed that some parents were not supportive towards environmental education, and that their practices conflicted with it.

Very often we have taught children to behave in certain ways in school but when they are taught in different ways by adults at home...for example when we teach children to clean rubbish in the countryside but parents tell them not to care about this and let rubbish lie. (Teacher interview, school A)

For example when we teach children to hold a party without using paper cups, plates but using the plates and cups at home, the parents are not willing to clean them. Rather they prefer using paper cups and paper plates for convenience. So children have environmental awareness but parents do not support them. (Teacher interview, school B)

Some parents are more traditional and may not accept the sort of learning associated with outdoor activities. They just want their children to absorb more and more

knowledge from books. This is also a barrier. Teachers have to explain clearly to the parents that activities provide a kind of learning. (Teacher interview, school F)

Sometimes some parents complain about our asking children to collect things...If they are really not cooperative, the teacher has to prepare materials so that the children can do craft work. (Teacher interview, school H)

Discussion

The survey and the interview findings in this study are to some extent congruent with each other. The survey findings, for example, revealed that the dominant environmental education activities in pre-schools were: cultivating pupils' appreciation of the natural environment; helping pupils understand the adverse impact of pollution on the environment; developing positive habits of protecting the environment and better consumer practices; cultivating pupils' aesthetic awareness of environmental stimuli; inviting parents to participate in environmental protection activities; helping pupils understand that humanity is part of the natural world; and stimulating pupils' interest in the environment through activities such as visits to the zoo and parks. These findings indicated that pre-school environmental education tended to focus more on education *about* the environment than education *in* and *for* the environment.

Documentary analysis and interview findings showed that most case study schools invited parents to help collect waste to make craft objects. They also taught environmental concepts such as pollution and environmentally friendly behaviour with regard to saving water and using less tissue paper. In addition, they occasionally organised visits to urban parks and country parks, which helped to foster appreciation of the natural environment. Despite the variety of environmental education activities, it appears that kindergartens in Hong Kong have not provided sufficient time and opportunities for children to interact with different natural materials and to take part in safe, pleasant, and memorable outdoor experiences (Wilson, 1994). As Wilson (1994, p.42) suggests, more opportunities can be provided for children to interact with artists, musicians and others, whose work is associated with the appreciation of nature, and to engage with the natural environment over an uninterrupted block of time.

With regard to education *for* the environment, it seems that not much is being done to encourage children to be agents of social improvement. Pre-school children may not have the maturity of mind to undertake the same sort of environmental action as adults, nevertheless as Tilbury (1994) argues: environmental education programmes 'foster an awareness of the individual's place and responsibilities in the local and global community and of his or her role in maintaining and improving environmental quality' (Tilbury 1994, p. 12). Moreover, many more activities that enable students to explore the connections between their own life and that of other

creatures and flora should be provided (Department of Education, Queensland 1993).


With regard to the fulfillment of the environmental education objectives set out by the Curriculum Development Council (1994, p. 3), it appeared that kindergartens in Hong Kong were making efforts to achieve most objectives, except that more attempts were needed to help children to 'expand their sphere of experience...and understand the interrelationship between individual children and their community'. In addition, the survey findings showed that the barriers to the promotion of environmental education in pre-school were inadequate class time, inadequate instructional materials and resources, inadequate knowledge among teachers, inadequate manpower to arrange outdoor learning activities and heavy teacher workload. The interview findings also revealed that teachers felt that the barriers to the promotion of environmental education were inadequate class time, inadequate instructional materials and resources, and inadequate knowledge of environmental education. Ham and Sewing (1987-88) suggested that barriers to environmental education could be categorised into four groups: conceptual barriers, logistical barriers, educational barriers and attitudinal barriers. The results of this study showed that teachers felt that the barriers were mainly *logistical*, such as the lack of time and resources, and *educational* in terms of lack of knowledge about environmental education. This pattern is commonplace elsewhere. To overcome these barriers, it is suggested that the Education Department consider providing more relevant instructional resources for teachers to implement environmental education and more financial resources for pre-schools to hire additional manpower for conducting outdoor activities. Teacher education institutions might also help to provide more training courses and seminars for pre-school teachers so that they can update their knowledge of environmental issues and further develop their professional skills in teaching environmental education.

The statistical analysis of the survey findings showed that variables such as personal views of environmental education (EEA), emphasis on environmental education in the curriculum (EMP), and preferred teaching approach (PTA) to teaching environmental education were significant positive predictors for the extent of environmental education taught. Meanwhile, current teaching approach, the discrepancy between preferred (PTA) and current teaching approach (CTA) were significant negative predictors for the extent of environmental education taught. These results suggest that in order to improve the extent of environmental education taught, it may be desirable first to enhance teachers' positive attitudes towards environmental issues and environmental education, cultivate teachers' progressive orientations towards teaching environmental education and stimulate teachers' views on the importance of environmental aspects in the pre-school curriculum. Furthermore, narrowing the gap between the preferred teaching approach and current teaching approach and transforming the current teaching approach through in-service professional development may also lead to an increase in the extent of environmental education taught. With regard

to teacher education for environmental education, Stimpson (1994) suggests that teacher educators help teachers clarify their thinking and reflect on their teaching style in the classroom. In addition, teachers should be given opportunities to practise different teaching methods and to compare the effectiveness of particular teaching styles (Yeung 1996).

On the other hand, the result of explained variances (about 16%) in the extent of environmental education taught in this study tends to be rather low, which may suggest that other critical factors may exist to explain the variation in actual practice. Some of these factors may be related to the life experiences of teachers at the childhood, college and adult stages, which, in turn, may affect their commitment towards teaching environmental education (Shuman and Ham, 1997). For example, teachers' involvement in outdoor nature activities and their experience of being active environmental citizens in their own workplace may influence their commitment to promoting environmental education despite the existence of barriers. Further research might explore how the life experiences of pre-school teachers affect the extent to which they teach environmental education.

Teachers in this study felt that parental reaction to environmental education activities might hinder the implementation of environmental education. This is an issue deserving attention, because Wilson (1994, p. 44) suggests that a quality early childhood environmental education programme should involve families in special nature-related activities at the school (e.g., planting a garden, celebrating Earth Day), donating recyclable materials, participating in field trips, and sharing information on nature-related activities and outings organised in the home or in the community. Past experience has shown that parents can be both a source of environmental knowledge and at the same time learn more about the environment, when they participate in school activities and help their children to collect materials and prepare assignments. Sutherland and Ham (1992), however, suggested that since child-to-parent transfer of environmental messages is often difficult, more emphasis should be placed on providing non-formal courses targeted at adults (parents). Schools might consider improving communication with parents on the importance of environmental education and making the presentation of environmental messages more interesting so as to engage their attention.

Overall, in order to improve the promotion of environmental education in pre-schools, the study indicated that we need to overcome barriers in connection with time, the knowledge base of teachers, resource provision and parental support. There is also the need to address some other unresolved issues such as teacher's attitudes and conceptualizations of environmental education (Lee, 1996), if the ideals of promoting sustainability education are to be achieved. 

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