

DEVELOPMENT OF AN ENVIRONMENTAL EDUCATION PROGRAM USING PLACE-BASED OUTDOOR LEARNING FOR ELEMENTARY SCHOOL CHILDREN IN MALAYSIA

A pilot project in Johor Bahru

マレーシアの小学校児童を対象とした地域に根ざした野外学習を導入した環境教育プログラムの開発
ジョホールバルにおけるパイロットプロジェクト

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This study aims to develop a new environmental education program as part of formal primary education in Malaysia. The program involves various place-based outdoor learning activities such as scientific field measurement. As the first attempt, a pilot project comprising three workshops on neighborhood greening was conducted with about 50 elementary school children in one of the typical neighborhoods in the city of Johor Bahru, Malaysia, followed by a tree-planting program. Almost all the children continued to participate in all the workshops with very high satisfaction levels as well as high levels of understanding. The improvements were seen in most of the items on children's environmental interests, activities and intentions. It was implied that the place-based outdoor learning activities including the scientific measurement improved their interests particularly in terms of the invisible environmental issues.

Keywords : *Environmental education, Outdoor learning, Place-based education, Workshop, Children's participation, Malaysia*

環境教育, 野外学習, 地域に根ざした教育, ワークショップ, 子ども参加, マレーシア

1. Introduction

Most of the developing countries in Southeast Asia experience rapid population growth particularly in urban areas. For instance, the total population of Malaysia has increased more than twofold from 10.4 million in 1970 to 28.3 million in 2010³⁾. Meanwhile, the percentage of people living in urban areas has increased at a faster rate during the same period from 27% to 71%³⁾. In these developing countries, children still account for a large proportion in their populations. For example, the percentage of children aged below 15 years old is 30.3% in Malaysia, 27.0% in Indonesia, 20.5% in Thailand, 23.6% in Vietnam and 35.4% in Philippines as of 2010⁴⁾. This clearly indicates the importance of improving environmental awareness of urban children, who are the future stakeholders, for achieving sustainable societies in these countries.

Environmental education (EE) has been recognized as one of the keys to achieve a sustainable development. The Earth Summit held in Rio de Janeiro in 1992 agreed to implement

Agenda 21, which required countries to develop national-level sustainability indicators and also called for a new orientation of all education for sustainability⁵⁾. Following the Earth Summit, intense interest in education as a tool to empower society for environmental action and sustainable development has been on the rise. Many agencies, institutions, and non-governmental organizations established education efforts, not just for young people, but for everyone in society⁶⁾. More recently, the United Nations also declared the 'United Nations Decade for Education for Sustainable Development' (2005-2014). The core goal of the above Decade is to integrate the knowledge and values of sustainable development into all aspects of learning and to encourage changes in behavior which will lead to a more sustainable society⁷⁾.

Many studies have shown the effectiveness of place-based approach in EE⁸⁻¹¹⁾. Driskell et al.¹²⁾, for instance, argued that people who take action to protect the environment are likely to have enjoyed positive experiences of nature as children and

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youth through outdoor play, hiking, camping, hunting, or fishing. Hart¹³⁾ also stated that through their community research and action, children will develop a sense of shared responsibility and skills that will enable them to continue to participate as adults and recognize the importance of their participation in local, national, and even global environmental decisions. Meanwhile, Rickinson, et al.¹⁰⁾ carried out a comprehensive review, which critically examined 150 pieces of research on outdoor learning published between 1993 and 2003. They concluded that two specific examples of benefits stemming from community projects are positive gains in science process skills and improved understanding of design and technology-related issues.

In Malaysia, the importance of EE was highlighted in the National Policy on the Environment 2002-Green Strategies on 'Education & Awareness'¹⁴⁾. EE in Malaysia was introduced in schools as Environmental Education Program across curriculum at primary and secondary levels¹⁴⁾. However, place-based activities have yet to be involved in these formal EE. Instead, non-formal education aims to complement EE and provide acquisition of new-updated knowledge and skills¹⁵⁾. The above study shows that these non-formal EE activities normally conduct awareness campaigns for different age groups, but other activities include some placed-based educations such as exhibitions, workshops and tree-planting. Therefore, further attempts are required to integrate effective place-based activities into the existing formal EE in Malaysia.

This study aims to develop a new environmental education program as part of formal primary education in Malaysia. The program involves various place-based outdoor learning activities such as scientific field measurement. As the first attempt, a pilot project comprising three workshops on neighborhood greening was conducted with about 50 elementary school children aged 10-12 years old in one of the typical neighborhoods in the city of Johor Bahru, Malaysia, followed by a tree-planting program. This paper summarizes the results of these workshops and discusses the environmental educational effects of the project.

2. Outline of Program

A typical neighborhood located about 5km from the city center of Johor Bahru was selected as case study area (Fig. 1). This area was developed in 1990s to 2000s and is considered a typical large-scale development in Malaysia, comprising not only housing estates but also some shopping complexes. The elementary school, which was involved in this project, is located on the southeast of the area. A large circular town park is situated at the center, which is connected to the residential areas through the road planted with trees (hereafter the green road).

This project was conducted in collaboration with a local university (Universiti Teknologi Malaysia), the local authority, the urban developer and the said elementary school (Fig. 2). The

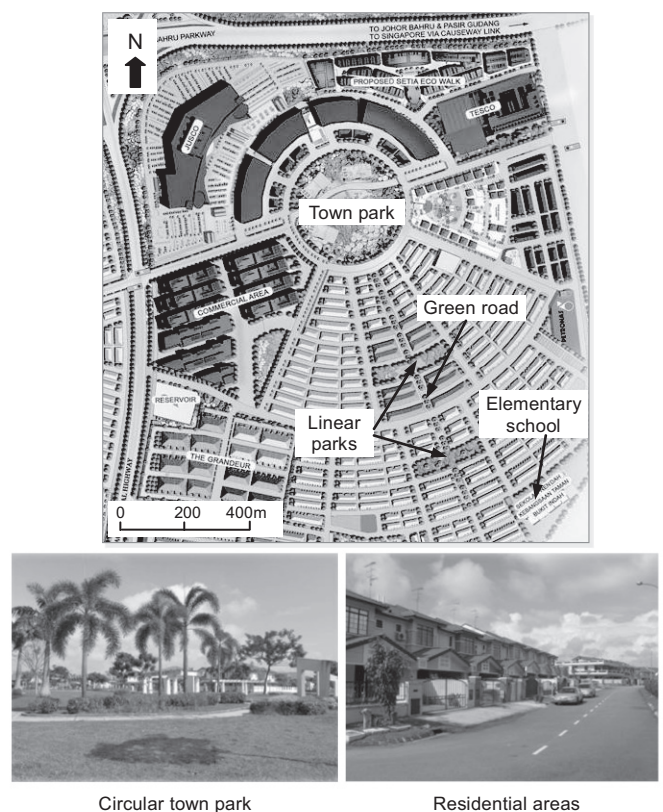


Fig. 1 Case study area

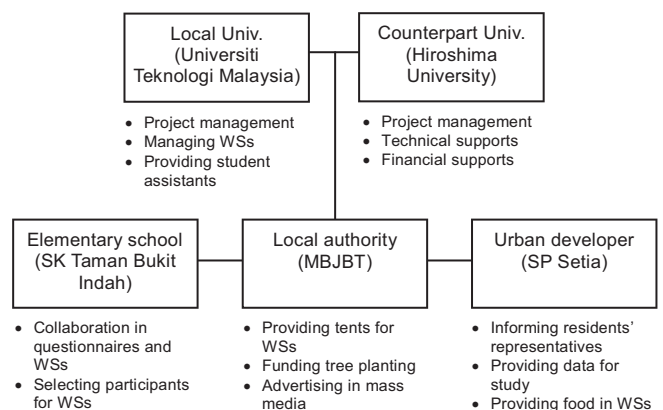


Fig. 2 Organization of steering group

first meeting among the above organizations was held at the local authority in August 2010 and the roles of respective organizations were determined as indicated in Fig. 2. Several meetings were held among these group members regularly and this played an important role in managing the program.

3. Results of Workshops

3.1. Preliminary Questionnaire

The preliminary questionnaire was carried out to 140 pupils in the above elementary school on 30 September 2010. The primary purpose was to investigate favorite and problem places perceived by the children. Secondly, their current environmental awareness was investigated in order to examine the effects of workshops by comparing the results before and after conducting

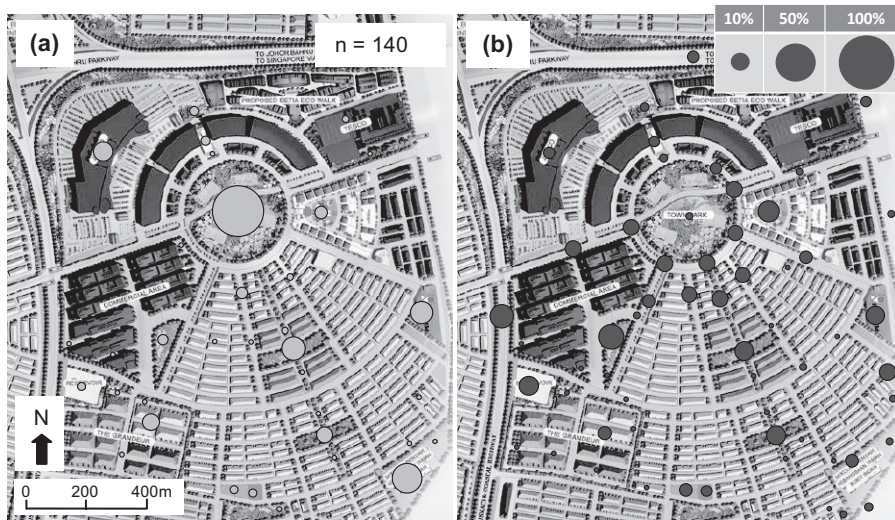


Fig. 3 Favorite and problem places perceived by children. (a) Favorite places; (b) Problem places.

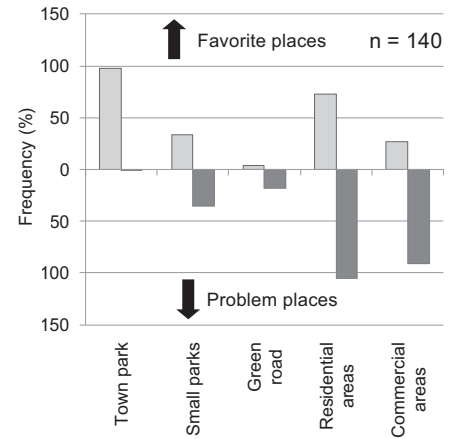


Fig. 4 Favorite and problem places by respective land uses

Favorite places	Problem places
<p>(1) Town park and small parks <i>Good place to play</i></p> <ul style="list-style-type: none"> • There are many children playgrounds. • I can play with my friends. • It is very fun and I can meet my friends. • I can do jogging with my friends. • It is comfortable to play here and there are so many green trees. • I can ride my bicycle here. • It has lots of play equipments and wide fields. • The place is well shaded and has many trees. • There are many green trees and therefore safe. • I like to see the trees and green areas. <p><i>Environmental conditions</i></p> <ul style="list-style-type: none"> • It is cool, comfortable and does not have air pollution. • It is windy and calm. • It is clean and beautiful. • There are lots of trees with good growth, clean, beautiful scenery that we can feel fresh and calm. • It is comfortable, shady and safe. • It has good scenery and very dramatic. • It is fun and safe. • That place is very peaceful. <p>(2) Residential areas</p> <ul style="list-style-type: none"> • It has many trees. • I can get many information in the school. • The garden encourages me to study. <p>(3) Commercial areas</p> <ul style="list-style-type: none"> • It is air-conditioned. • We can buy goods. 	<p>(1) Residential areas <i>Trunk roads</i></p> <ul style="list-style-type: none"> • There are many cars and it is dangerous for me. Also it gives air pollution to the environment. • There are many cars and it can cause accident for children when crossing the road. • The place is very noisy. • There are many rubbishes inside the drain. • It does not have place to walk and run. • There are many stray dogs and cars. • There are lots of lorries with dust and smoke that can cause air pollution. <p><i>Residential areas</i></p> <ul style="list-style-type: none"> • The place is very quiet, not safe and smelly. • There is no children playground. • It has many bushes, dangerous animals and has bad smell. • My parent said it is dangerous to play. • There are a lot of rubbishes, dirty and dark places, and intruders. <p>(2) Commercial areas</p> <ul style="list-style-type: none"> • This place is so noisy. • There are many rubbishes and cars around there. • Very dangerous, not clean, air pollution and lack of trees. • Many people like to throw rubbish and make the place dirty with bad smell. <p>(3) Small parks</p> <ul style="list-style-type: none"> • The trees are so big that they make me feel scary. • This place is very quiet. • It has many rubbishes and dangerous for us to play. • This place is dirty and has bad smell.

Fig. 5 Reasons for favorite and problem places (selected)

them. The respondents comprised fourth year pupils (approximately 10 years old) (44%) and fifth year pupils (11 years old) (56%) with the male-female ratio of 51 to 49%. All of them live in the said neighborhood. The researchers visited the elementary school and gave some instructions to the children before answering. All the children answered the questions. The map of neighborhood was distributed to the respondents and they were asked to mark their favorite and problem places directly onto the map (Fig. 3). Also, several tags (Post-it) were given to ask the reasons for selecting these places. The comments obtained from the respondents are summarized in Fig. 5.

As shown in Fig. 3, the large town park was found to be favored by almost all the children (99%), followed by their elementary school (29%), the gas station including convenience

store (17%) and the large shopping center (13%). It can be seen that there are several major places favored by many children regardless of the locations of their residences. Meanwhile, there was a tendency that the problem places are broadly distributed. Fig. 4 indicates the frequencies of favorite places and of problem places selected in respective land uses. As shown in Fig. 5, the children favor the parks because it is a good place to play and meet with their friends. Also, it is seen that they prefer the environmental conditions of the parks and the term 'trees' can frequently be seen in their favorite comments. Residential areas and commercial areas recorded relatively higher frequencies in terms of problem places in Fig. 4. As shown in Fig. 3, most of the problem places in these areas were marked on the roads. They worry about the safety on the roads in particular (see Fig. 5).

Time	Activities	Venue
8:30	Introduction <ul style="list-style-type: none"> Aims and structure of the project Aims and structure of today's workshop Presentation on preliminary questionnaire 	Elementary school
9:00	Group formation <ul style="list-style-type: none"> Group formation (ten groups of five pupils with a moderator) Design of route for town watching 	Neighborhood area
9:30	Children-led observation <ul style="list-style-type: none"> Visiting their favorite/problem places in groups, taking pictures 	
11:00	Group discussion and lunch <ul style="list-style-type: none"> Reasons for favorite/problem places 	Town park
11:30	Presentation <ul style="list-style-type: none"> Presentation on favorite/problem places 	Elementary school
12:30	End of workshop	
13:00	Evaluation questionnaire	
13:30	Close	



Children-led observation



Presentation

Fig. 6 Detailed schedule of the 1st workshop (6 Oct 2010)

About 97% of the respondents answered that they were interested in participating in the following workshops. Out of them, 50 pupils were chosen by the principal of the said elementary school and attended the following three workshops continuously.

3.2. The 1st Workshop: Children-led Observations

The main purpose of the 1st workshop was to let the children walk around their neighborhood from their school to the town park in groups and observe their favorite and problem places. The workshop was conducted as a class activity on a weekday (6 October) in collaboration with the elementary school. The detailed schedule of the workshop is shown in Fig. 6.

After giving an introduction, the results of the preliminary questionnaire were explained by the researchers. The 50 participants were then divided into ten groups of five pupils and discussed the route that they would take in respective groups. They were encouraged to head to the large circular town park. One university student was allocated to each of the groups as an assistant, but these students did not instruct the pupils to go to the particular places at all.

The observations took about one and a half hours, respectively (see Fig. 6). During the trip, the children took some pictures and discussed the reasons why those places were favored or disfavored among the group members. After arriving at the large town park, the group discussions were made respectively. The results of discussions were presented by each of the groups (see Fig. 6). A brief evaluation questionnaire was carried out at the end of the workshop (Figs. 7-9). As shown in Fig. 7, about 52% answered that they found new things in their

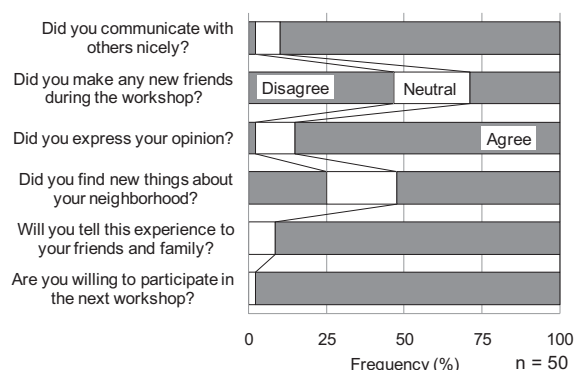


Fig. 7 Children's opinions of the 1st workshop

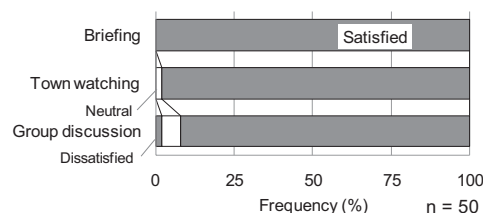


Fig. 8 Satisfaction levels of the 1st workshop

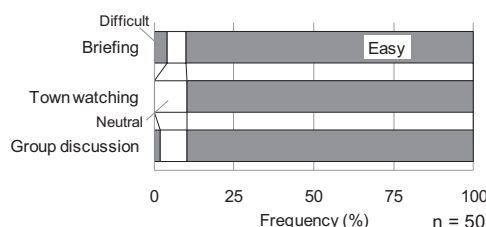


Fig. 9 Understanding levels of the 1st workshop

neighborhood during the workshop. Except for a few questions, most of the respondents gave positive opinions. It can be seen that the children were highly encouraged to participate in the workshop and express themselves freely. As shown, 98% of the respondents answered that they were willing to participate in the next workshop. Moreover, as shown in Fig. 8, almost all the participants were satisfied with the programs provided. It is also observed that the majority of them felt these programs easy (Fig. 9). The first workshop is found to be highly successful as an 'ice breaker' of this program with high children's satisfaction levels.

3.3. The 2nd Workshop: Air Temperature Recording

The 2nd workshop was conducted on 15 November. The workshop aimed to enhance children's awareness towards the importance of green spaces by letting them experience the real environment through conducting field measurement. A total of 47 children out of 50 participated in the workshop (Fig. 10).

As before, a preliminary meeting was held in the elementary school to explain the results of the previous workshop. Some instructions on the field measurement were given before starting it. Each of the groups was given a small air temperature and relative humidity recorder (T&D TR-72U). They were guided to measure these data and answer some questions on thermal conditions in several places with the help of assistants, i.e. university students (see Fig. 10). A total of 97 places were visited

Time	Activities	Venue
8:30	Introduction <ul style="list-style-type: none"> • Presentation on the 1st workshop • Aims and structure of the 2nd workshop • Instructions on field measurement 	Elementary school
9:00	Air temperature recording <ul style="list-style-type: none"> • Measurement of air temperature and relative humidity at several places • Answering the questionnaire on thermal conditions 	Neighborhood area
10:30	Group discussion and lunch <ul style="list-style-type: none"> • Analysis of thermal conditions 	Town park
11:00	Presentation <ul style="list-style-type: none"> • The highest/lowest temperature places 	
12:00	End of workshop	
12:30	Lecture <ul style="list-style-type: none"> • Human thermal comfort • Effects of green spaces 	Elementary school
12:50	Evaluation questionnaire	
13:00	Close	



Air temperature recording



Lecture

Fig. 10 Detailed schedule of the 2nd workshop (15 Nov 2010)

and measured by the ten groups.

Fig. 11 indicates the summary of the above field measurements. Each of the figures shows the mean values and the standard deviations in different land uses. As shown, the data are analyzed by the two data sets obtained under the unshaded conditions as well as shaded conditions, respectively. The mean air temperatures between shaded and unshaded places recorded similar values in the town park and green road, but slight differences are seen in the small parks and residential areas (Fig. 11a).

As shown in Fig. 11c, the wind conditions were perceived much stronger in the town park compared with the other places. This probably well represents the actual conditions because the town park is apparently more spacious than the others. The average thermal comfort conditions perceived by the children are found to be very different between the unshaded and shaded places. It is interesting to see that, in case of shaded places, the average thermal comfort levels are below the neutral level, which is three, in all the areas. The profile of the mean values of thermal comfort level (Fig. 11d) resembles that of air temperature (Fig. 11a) especially in the last three areas, i.e. the small parks, green road and residential areas. However, the average comfort levels are found to be particularly low (cool) in the town park. This is probably due to the relatively windy conditions in the park. In theory, the shaded and windy conditions would provide a better thermal comfort to people in the tropical outdoors. Hence, the above results indicate that the children perceived the outdoor thermal conditions precisely.

As have been seen in the previous workshops, the large

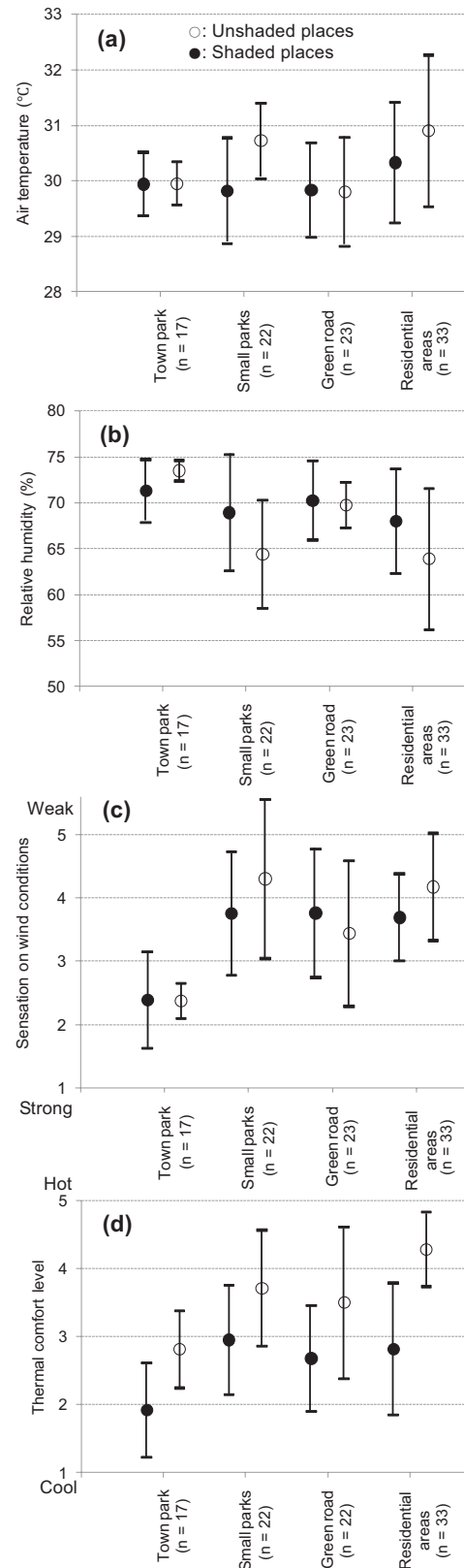


Fig. 11 Results of field measurement. (a) Air temperature; (b) Relative humidity; (c) Sensation on wind conditions; (d) Thermal comfort level.

circular town park was highly favored by almost all the participants. And the abundance of trees in the park was found to be one of the main reasons for favoring the parks (see Fig. 5).

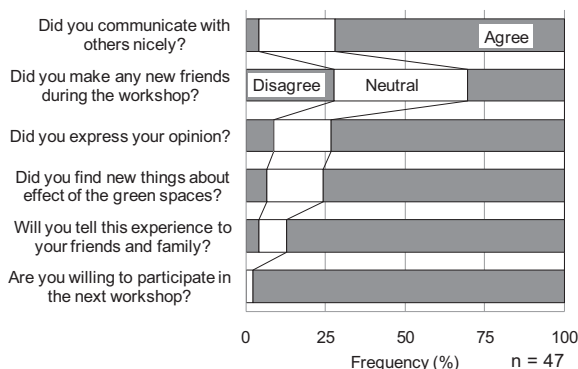


Fig. 12 Children's opinions of the 2nd workshop

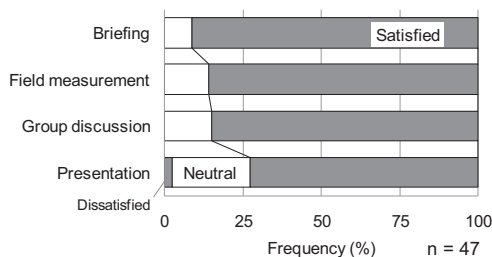


Fig. 13 Satisfaction levels of the 2nd workshop

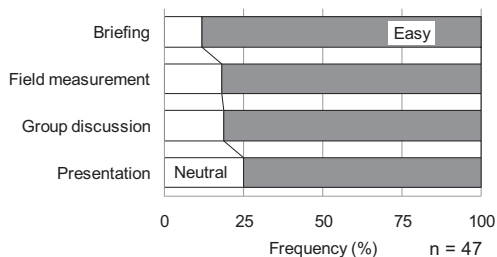


Fig. 14 Understanding levels of the 2nd workshop

This indicates that the comfortable thermal conditions mainly due to the relatively stronger wind conditions and shading effects in the park, which are seen in Fig. 11, may have influenced the children's preference for the park.

After presenting the results of measurement by each of the groups, a short lecture was given to the children in the elementary school (see Fig. 10). The purpose of the lecture was to provide the children with scientific basis on human thermal comfort and effects of green spaces. Our intention was to give the scientific knowledge to them after experiencing the effects of green spaces through the field measurement, in order to maximize the educational effects.

As before, a brief evaluation questionnaire was conducted at the end of the workshop (Figs. 12-14). As compared with the results of the previous workshop, one of the major improvements is seen in terms of the new findings due to the workshop (Fig. 12). As shown, about 76% of the respondents answered that they found some new things during the workshop. About 98% of them maintained the intention of participating in the next workshop. Also, almost none of them were dissatisfied with the respective programs (Fig. 13).

3.4. The 3rd Workshop: Design Workshop

Time	Activities	Venue
8:00	Introduction <ul style="list-style-type: none"> • Presentation on the 1st and 2nd workshops • Aims and structure of the 3rd workshop • Instructions on model making and presentation 	Elementary school
8:40	Design workshop <ul style="list-style-type: none"> • Design of greening plan by making a simple model in group 	
10:00	Presentation <ul style="list-style-type: none"> • Presentation on plan using the model 	
11:00	Questionnaires and lunch <ul style="list-style-type: none"> • Evaluation questionnaire • Post questionnaire 	
11:50	Remarks	
12:00	Close	



Model making



Group photo

Fig. 15 Detailed schedule of the 3rd workshop (18 Jan 2011)

The 3rd workshop was carried out on 18 January 2011. The idea was to let the children design and propose a greening plan based on the experiences in the previous workshops. All the 50 pupils participated in the workshop (Fig. 15).

Each of the groups was given a large map of the neighborhood of A0 size stuck on a polystyrene board. The locations of existing large trees were indicated in the map beforehand. Three sizes of tree models, which were made of toothpicks and cotton, were used. The children were encouraged to put these miniature models of tree additionally onto the existing situation. The results of the previous field measurement were also distributed to the groups for their information.

About one and a half hours were given and a simple 3D model of greening plan was completed by each of the groups. Fig. 16 shows three examples of model prepared by the children. The presentations were made by all the groups by showing the models from 10:00 to 11:00am. The children's designs are mainly divided into two groups. The designs of the first group attempted to add more trees to the places where trees already exist, such as the large town park and linear parks. Group A is one of the examples of this group (Fig. 16a). This group considered less about the results of the previous measurement. The other several groups took into account the existing thermal conditions as well as the cooling effects of trees in their designs (Fig. 16bc). As shown, they tended to plant trees in places where there are few trees and relatively worse thermal conditions were observed in the previous workshop. Another important characteristic of this group is probably the planting area they cover. As shown, they aimed to cover the whole neighborhood and provide a better thermal comfort widely. They mentioned in the presentation that the main purpose of their designs is to provide more shading and

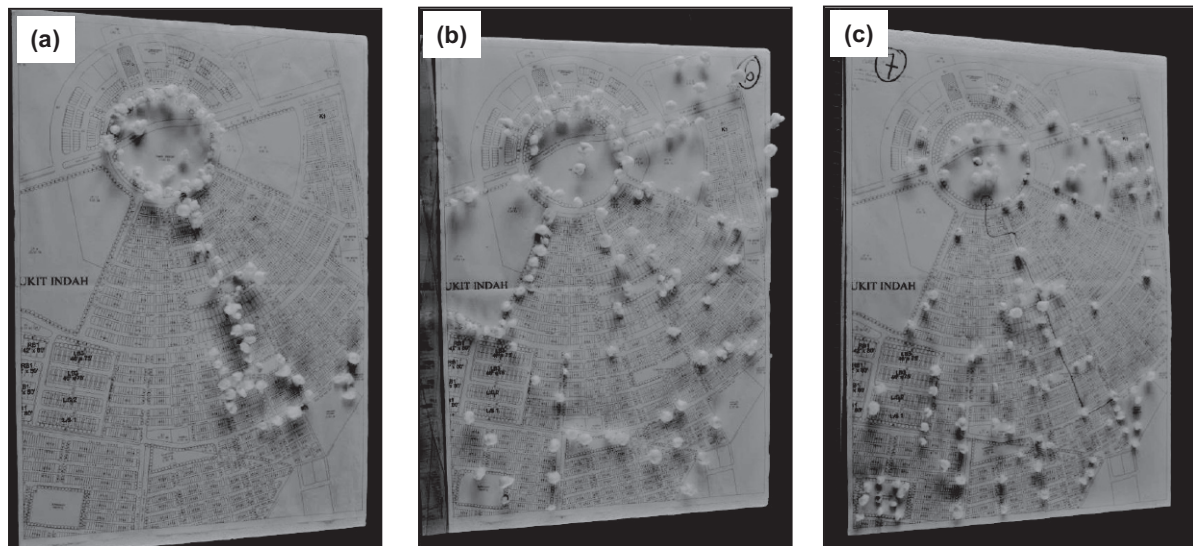


Fig. 16 Examples of greening plans proposed by children

better thermal conditions to people in the whole neighborhood.

As before, a brief evaluation questionnaire was carried out at the end of the workshop (Figs. 17-19). One important improvement can be seen in the first question (Fig. 17). As shown, the respondents who answered that they communicated with others nicely were largely increased from 72% in WS 2 to 90% in WS 3. And, surprisingly, 100% of the respondents stated that they wanted to participate in the workshop if a similar workshop is conducted in the future.

4. Environmental Educational Effects

As described earlier, the same questionnaires were conducted before and after the three workshops in order to examine the change in children's environmental awareness. Fig. 20 indicates the averaged scores for respective questions using three-point scale among the participants of workshops (approximately 50 samples). Table 1 shows the averaged changes of scores in respective questions and the results of T-tests for the paired samples obtained before and after the workshops.

Fig. 20a shows the answers to the questions on whether they are interested in respective environmental issues indicated in the figure. The above issues comprise (1) fundamental living environmental issues concerning safety, healthy, convenience and comfort, and (2) several specific items related to the focus of the present project. The latter includes 'Trees and flowers in your house', 'Amount of green spaces', 'Beauty of landscape' and 'Urban heat island'. As shown, the average scores were increased in 13 items out of 14 (see Table 1a). Relatively large increases are seen in terms of 'Noise pollution (+61.3%)', 'Air pollution (+26.0%)', 'Disaster like fire (+22.9%)', 'Urban heat island (+18.8%)', 'Access to school (+17.6%)' and 'Safety against burglar or thief (+17.4%)', though the statistically significant difference is seen only in terms of 'Noise pollution' (Table 1a). In contrast, a

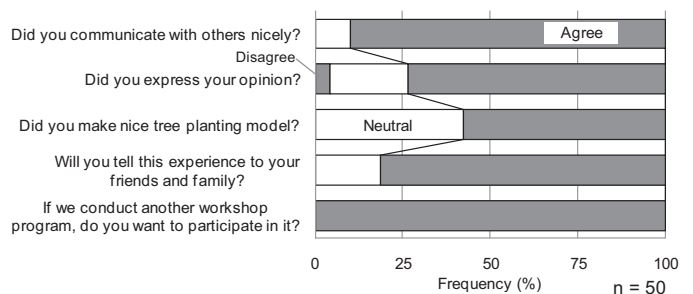


Fig. 17 Children's opinions of the 3rd workshop

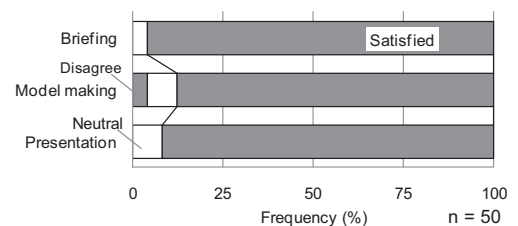


Fig. 18 Satisfaction levels of the 3rd workshop

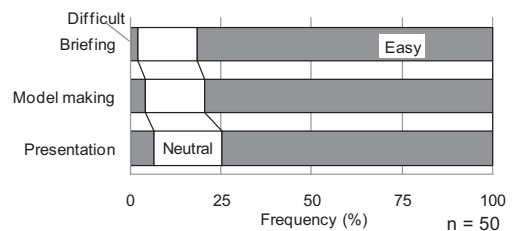


Fig. 19 Understanding levels of the 3rd workshop

slight decrease is seen in terms of 'Convenience for shopping (-8.4%)'. It is interesting to notice that most of the environmental issues showing relatively large improvements are the items that cannot be perceived visually. The examples of the above are 'Noise pollution', 'Air pollution', 'Urban heat island' and 'Safety against burglar or thief'. These invisible issues are normally hardly understood by the children unlike visible issues, such as 'Beauty of landscape', 'Amount of green spaces', and 'Trees and flowers', etc. It is implied that the place-based outdoor learning

activities including the scientific measurement improved their interests particularly in these invisible environmental issues.

As shown in Fig. 20bc, the improvements of children's environmental awareness can also be seen in most of the questions except for some items, such as 'Turn off the tap during tooth brushing' and 'Turn off the lights and TV when not in use'. The left side of Fig. 20bc shows the children's current practices in respective environmentally friendly activities, while the right side indicates their intentions to do these activities in the near future. As for the daily activities (Fig. 20b), significant differences are observed in 'Talk about environmental problems with friends or family (+46.9%)', 'Use more public transportation than a private car (+31.3%)', 'Grow flowers or trees at home (+20.4%)' and 'Use things carefully for lasting long time (+20.3%)' in terms of current practice (see Table 1b). In case of community activities (Fig. 20c), large improvements can be seen in 'Study your neighborhood and global environments at school (+87.7%)' in terms of current practice (see Table 1b). In case of community activities (Fig. 20c), large improvements can be seen in 'Study your neighborhood and global environments at school (+87.7%)' in terms of current practice (see Table 1b).

and 'Plant trees or flowers in your neighborhood (+17.2%)' in terms of current practice (see Table 1c).

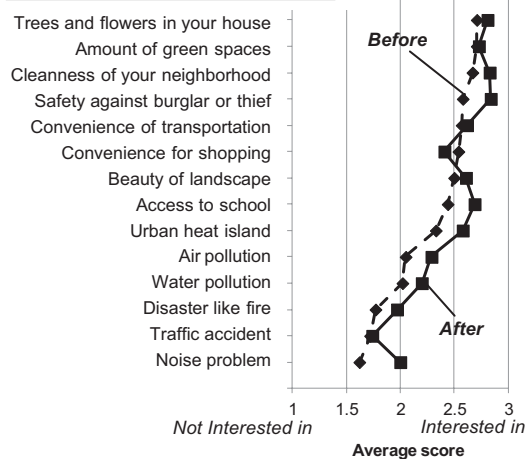
There is a tendency that the averaged scores of 'intention to do' are higher than those of 'current practice' by about 0.2-0.3 in both before and after the workshops. This means that the children's awareness has not yet been enough to shift their

Table 1 Results of T-tests for paired samples

(a) Interests in environmental issues

Items	n	Diff.	Sig.
1 Noise pollution	37	61.3	**
2 Air pollution	42	26.0	-
3 Disaster like fire	40	22.9	-
4 Urban heat island	33	18.8	-
5 Access to school	39	17.6	-
6 Safety against burglar or thief	45	17.4	-
7 Water pollution	41	16.5	-
8 Cleanness of your neighborhood	42	9.6	-
9 Beauty of landscape in your neighborhood	38	7.3	-
10 Trees and flowers in your house	42	5.8	-
11 Convenience of transportation	40	3.2	-
12 Traffic accident	43	2.8	-
13 Amount of green spaces in your neighborhood	41	1.2	-
14 Convenience for shopping	41	-8.4	-

(a) Interests in environmental issues



(b) Environmentally friendly activities in daily life

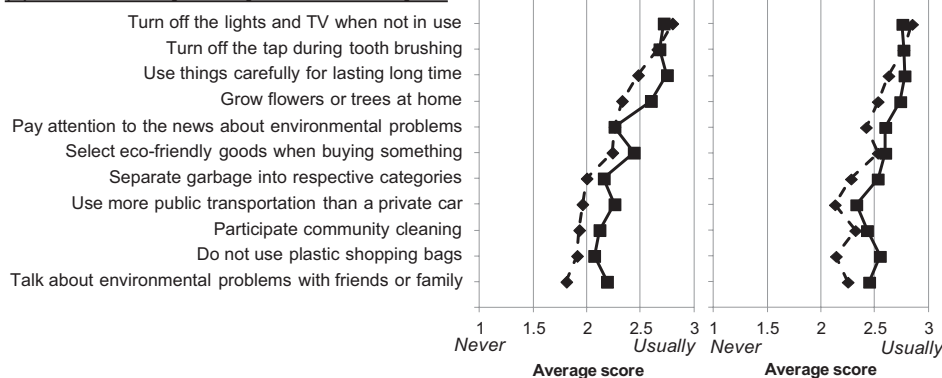
Items	Current practice			Intention to do		
	n	Diff.	Sig.	n	Diff.	Sig.
1 Talk about environmental problems with friends or family	42	46.9	**	44	16.0	-
2 Use more public transportation than a private car	46	31.3	**	45	17.7	-
3 Grow flowers or trees at home	45	20.4	*	43	8.3	*
4 Use things carefully for lasting long time	44	20.3	*	46	13.7	-
5 Participate community cleaning	43	18.2	-	44	9.2	-
6 Select eco-friendly goods when buying something	41	17.6	-	45	36.0	-
7 Do not use plastic shopping bags	43	16.1	-	44	4.6	**
8 Separate garbage into respective categories	43	16.0	-	43	19.5	-
9 Turn off the tap during tooth brushing	47	1.2	-	47	0.0	-
10 Pay attention to the news about environmental problems	46	0.0	-	45	12.7	-
11 Turn off the lights and TV when not in use	46	-4.4	-	46	-4.9	-

(c) Environmentally friendly community activities

Items	Current practice			Intention to do		
	n	Diff.	Sig.	n	Diff.	Sig.
1 Study your neighborhood and global environments at school	46	87.7	**	44	16.3	-
2 Clean the public spaces like parks or streets	46	30.0	-	44	15.3	-
3 Plant trees or flowers in your neighborhood	46	17.2	*	44	2.8	-
4 Recycle renewable or reusable items	44	8.3	-	44	10.5	-

Diff. = 'After' - 'Before' (%); * = significant at 5% level; ** = significant at 1% level

(b) Environmentally friendly activities in daily life



(c) Environmentally friendly community activities

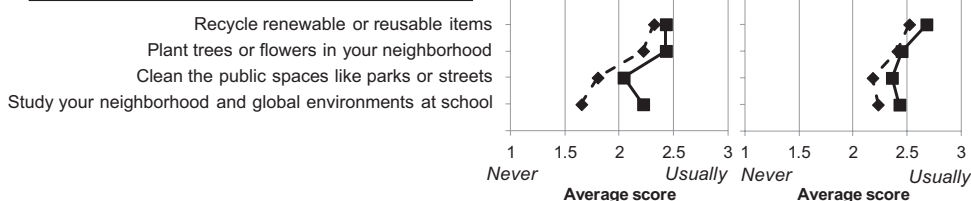


Fig. 21 Tree-planting program

Fig. 20 Change in children's environmental awareness before and after the workshops. Left: Current practice, Right: Intention to do.

'intentions' to actual 'actions'.

5. Tree-Planting Program

As a follow-up program, a tree-planting was held in the large circular town park on 17 September 2011 (Saturday) as an extra-curricular activity (Fig. 21). The greening plan was firstly designed by the steering group members based on the children's ideas proposed in the previous design workshop. About 50 saplings were donated by the local authority. Before the planting day, the researchers visited the school and explained the said greening plan in order to obtain the feedbacks from the children. A total of 38 children out of the selected 50 pupils participated in this event with the attendance of seven teachers and 15 university students.

6. Conclusions

- (1) A pilot project comprising three workshops on neighborhood greening was conducted with about 50 elementary school children in one of the typical neighborhoods in Johor Bahru, Malaysia, followed by a tree-planting program. Almost all the children continued to participate in all the workshops with very high satisfaction levels as well as high levels of understanding.
- (2) The 2nd workshop aimed to enhance the children's awareness towards the importance of green spaces by letting them experience the real environment through conducting field measurement. The results showed that the children perceived the outdoor thermal conditions precisely. It was seen that the comfortable thermal conditions perceived by the children mainly due to the relatively stronger wind conditions and shading effects in the town park might have influenced their preference for the park.
- (3) The idea of the 3rd workshop was to let the children design and propose a greening plan by making a simple 3D model based on the experiences in the previous workshops. It was observed that several groups tended to plant trees in places where there were few trees and relatively worse thermal conditions were observed in the previous workshop.
- (4) The same questionnaires were conducted before and after the workshops. The improvements were seen in most of the items on children's environmental interests, activities and intentions. It was implied that the place-based outdoor learning activities including the scientific measurement improved their interests particularly in terms of the invisible environmental issues.
- (5) There was a tendency that the averaged scores of 'intention to do' were higher than those of 'current practice' in both before and after the workshops. This means that the children's awareness has not yet been enough to shift their 'intentions' to actual 'actions'. Further improvements are necessary in our program to encourage the above shifts more.

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和文要約

1. はじめに

東南アジアの途上国の多くでは、都市化が進行し、人口をますます増加させている。これらの国々では、依然として子どもの人口割合が高く、都市の子どもの環境意識を高めることは、そうした途上国において持続可能な社会を実現させるために特に重要といえる。実際、環境教育は、持続可能な開発を実現させるうえでの重要な鍵のひとつとして位置づけられている。一方、近年において特に注目される環境教育アプローチのひとつが‘Place-based education’、すなわち、屋外活動等を積極的に取り入れた「地域に根ざした教育」である。マレーシアにおいても環境教育は重要視され、初等教育のカリキュラム等にも組み込まれているが、上述の地域に根ざした教育を導入した例は見られない。そこで本研究では、マレーシアの初等教育の一部として組み入れることを目標として、小学校児童を対象とした地域に根ざした野外学習を導入した新たな環境教育プログラムを開発する。この第一段階として、ジョホールバルにおいて3回のワークショップと植樹によって構成される住宅地緑化に関するパイロットプロジェクトを実施した。本報では、その結果を報告し、その環境教育効果について議論する。

2. プログラムの概要

ケーススタディ対象として、Fig. 1 に示すジョホールバルの典型的住宅地を選定した。同地区内の小学校や現地大学、地方自治体、地元デベロッパーと共同でプロジェクトを実施した (Fig. 2)。

3. ワークショップの結果

対象小学校の4、5年生児童140名を対象として、ワークショップに先立って事前アンケートを実施した。ここでは、地区内の児童の好きな場所、問題のある場所を把握することを主な目的とした (Fig. 3)。地区中心に位置する円形の都市公園を好きな場所とする児童が殆どであった (99%) (Figs. 4-5)。また、このアンケートにおいて、97%の回答者がワークショップへの参加を希望した。これらの児童から50名を選び、この50名が以下の3回のワークショップに継続的に参加した。なお、3回のワークショップはいずれも通常授業の一部として平日に行われた。

第1回ワークショップでは街歩きを実施した。50名の児童を5人ごとのグループに分け、主体的に地区内の好きな場所と問題のある場所を観察させた (Fig. 6)。さらに、その観察結果をグループごとに発表させ活発な議論を促した。ワークショップの最後に、このプログラムに対する簡単な評価アンケートを実施した (Figs. 7-9)。参加者の満足度、及び、理解度は非常に高かった。また、98%の参加者が次回ワークショップへの参加を希望した。

第2回ワークショップにおいて環境実測調査を取り入れた。実測調査を行うことによって、屋外環境を実体験させ、それによって参加児童の環境意識を高めることを目的とした (Fig. 10)。小型温湿度計を用いた実測とアンケートによって、地区内各点の熱環境を調べさせた結果を Fig. 11 に示す。これらの結果から、参加児童が比較的正確に屋外熱環境を把握していることが読み取れた。事前アンケートにおいて、地区中心の都市公園は殆どの児童から好きな場所に選ばれていたが、それは緑の多い都市公園に形成される良好な熱環境が要因である可能性が示された。また、前回同様のワークショップ後のアンケートにおいても高い評価が得られた (Figs. 12-14)。

第3回ワークショップでは、簡単な模型を用い地区の緑化計画を立案させた (Fig. 15)。既存の樹木の位置を示した大判の地図を配り、それに新たな樹木を加えるデザインをグループごとに提案させた。提案されたデザインは、それらの特徴から、大きく、①都市公園や緑道等、既に樹木が多い空間にさらに緑を配置するグループと、②前回の実測結果等を考慮し、緑が少なく熱環境が悪いと判断された空間に緑を配置するグループに分けられた (Fig. 16)。また、ワークショップ後のアンケートにおいても、引き続き高い評価が得られた (Figs. 17-19)。

4. 環境教育効果

3回のワークショップの前後に同様のアンケートを実施し、本プログラムの環境教育効果を評価した。Fig. 20a, Table 1a のとおり、提示した14項目の環境問題のうち13項目について参加児童の関心が高まった。特に、「騒音」、「大気汚染」、「都市ヒートアイランド」などの目に見えない環境問題に対する関心が高まった点に特徴がある。これは、気温実測といった科学的な環境実測調査を含む野外学習をワークショップに導入したことによる効果と考えられる。

Fig. 20bc, Table 1bc のとおり、環境を考慮した活動に関しても、現在の行動、行動意志ともに、殆どの項目において参加児童の意識の向上が見られた。日常生活における活動 (Fig. 20b)、コミュニティにおける活動 (Fig. 20c) の両方に共通して、「将来的な行動意志」の方が「現在の行動」よりも平均スコアが高かった。

5. 植樹プログラム

3回のワークショップ終了後に、課外活動として植樹を実施した (Fig. 21)。ワークショップにおいて提案された緑化デザインを参考にし、地区中心に位置する都市公園に約50本の苗木が植えられた。38名の児童と、7名の小学校教員と15名の大学生が参加した。

6. 結 論

(1) 約50名の参加児童の殆どが3回のワークショップに連続して参加し、いずれのプログラムにおいても、非常に高い満足度を示すとともに、高い理解度が確保された。

(2) 第2回ワークショップにおいて環境実測調査が導入された。ここでは、実測調査を行うことによって、屋外環境を実体験させ、それによって参加児童の環境意識を高めることを目的とした。これらの結果から、参加児童が比較的正確に屋外熱環境を把握していることが読み取れた。

(3) 3回のワークショップの前後に同様のアンケートを実施し、本プログラムの環境教育効果を評価した。参加児童の環境問題への関心、環境に考慮した活動についての現在の行動、行動意志に関する殆どの項目において、本プログラム参加による意識の向上が認められた。特に、「騒音」、「大気汚染」、「都市ヒートアイランド」などの目に見えない環境問題に対する関心が高まった点に特徴があった。これは、気温実測といった科学的な環境実測調査を含む野外学習をワークショップに導入したことによる効果と考えられる。

(4) 日常生活における活動 (Fig. 20b)、コミュニティにおける活動 (Fig. 20c) の両方に共通して、「将来的な行動意志」の方が「現在の行動」よりも参加児童の平均スコアが高かった。参加児童の「意志」を実際の「行動」にさらに移すようプログラムの改良を行うことが今後の課題である。

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