

WCLTA 2013

I like the red plants: Children's perceptions of their local natural environments in Australia and Singapore

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Abstract

Research has raised concerns that there is a growing disparity between young children and their local, natural environments [1; 2]. Concerns over environmental issues and children's awareness of their local, natural environment have further prompted education departments to include environmental and sustainability concepts in curriculum documents. In the most recent Australian curriculum, currently in draft form, a major component of the curriculum has included sustainability [3]. To gain an understanding of children's awareness of their environment, an action research study was conducted between Australia and Singapore with two groups of children aged five to seven years. The study explored children's perceptions of their local natural environments and whether, if they were offered an authentic, real-life activity such as postcard exchanges with children in another location, their awareness of, and interest in, both their own and others' local natural environments would increase. The study found that while children's awareness of sustainability and their local, natural environment increased through the activity, children in Australia were more aware of, and interacted with, their local natural environment than children in Singapore.

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Selection and peer-review under responsibility of the Organizing Committee of WCLTA 2013.

Keywords: Early childhood education, sustainability, environmental education, international student engagement;

1. Introduction

Over the last decade, concerns have been raised about children becoming disengaged with their local, natural environments [1; 2]. Further to this, global concerns over environmental issues have prompted education departments to include environmental and sustainability concepts in curriculum documents [3]. To ascertain the understanding and awareness children had of their local, natural environment, an action research study was

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undertaken with two groups of children aged five to seven years. One group was located in Australia and one was located in Singapore. Through an authentic, real-life activity exchange of postcards between both groups, one group of children in Singapore and one group of children in Australia, the study set out to explore the current perceptions of each group of children regarding their local natural environment and whether, if they were offered an authentic, real-life activity such as postcard exchanges with children in another location, their awareness of, and interest in, both their own and others' local natural environment would increase.

The background to the study is firstly considered. This is followed by the research method and a description of how the study was conducted. The findings of the study are then presented followed by a discussion of the findings. The paper finally offers recommendations along with the conclusion.

2. Background to the study

Singapore has changed immensely in a short period of time, from a country virtually covered with tropical rainforest to a modern first-world developed nation which of which only 2.86% of original rainforest remains at the present time [4]. Children of today are expected to be the future environmental caretakers, yet, without an awareness and appreciation of the importance of their local natural environments, these future decision-makers may undervalue and regard the remaining rainforest with indifference.

The value of raising an awareness of the local natural environment with young children through the educational system has been previously discussed by Michaels [5] who notes:

Early connections to the environment and environmental sustainability are the basis for the future, as children will grow into young adults with an affinity for the environment and the earth, and into adults who are able to make genuine contributions and informed decisions about climate change, global warming and sustainability (pp. 20-21).

However, children living in Singapore today generally seem disconnected and uninterested in their local natural environment. This, in part, may be due to the high demands and pressures of an academic curriculum which leaves no time for reflective strolls in the rainforest. In the influential work, *Last Child in the Woods* [2], Louv describes this institutionalised disinterest as a “nature deficit disorder” (p. 36). This is defined as “the human costs from alienation from nature, among them: diminished use of the senses, attention difficulties, and higher rates of physical and emotional illnesses” (p. 36). Previous research [6] has established that children’s concept of the environment is confined to “‘something out there’ – a place, possibly including living plants and animals, but essentially separate from themselves” (p. 58), thus reinforcing and confirming this disconnect.

In order to seek methods to mitigate this potential 'nature deficit disorder', this study sought to increase young children’s awareness of their local, natural environment and the consequential need for environmental sustainability through a postcard interaction with children from Australia. As such, the specific research question became: *If Singapore children are paired with children in Australia through a postcard exchange, would it increase children's awareness of:*

- *their own natural environment;*
- *the natural environment of the other country; and*
- *the necessity for a sustainable balance between the needs of mankind and the needs of the planet?*

The next section discusses how the study was conducted. An action research approach was considered the most appropriate method to understand children's current perceptions of their local, natural environment and whether an authentic, real-life postcard exchange would increase their awareness, understandings and concern for their and others' local, natural environments .

3. The research method

Action research according to Mac Naughton & Hughes [7] is "a cyclical process of 'think-do-think' to research and create change" (p. 1). The change, it is hoped, is always "for the better" [7], which in this case is to improve

children's understanding of, and concern for, their local natural environments and its sustainability (p. 5). Action research involves an initial baseline data collection before the intended intervention is implemented, which in this case is the exchange of postcards between children in Singapore and Australia [1]. This is then followed by a second data collection following the intervention to determine whether the intervention has resulted in the desired change [1].

The action research method employed a mixed methods approach using both quantitative (as an objective numerical result needed to be obtained), and qualitative data (as a subjective observation of the children's level of awareness could be seen). Quantitative data was collected through the children's postcards where the number of items drawn and cited was recorded to see whether there was an increase in children's awareness of their environment and of sustainability. Qualitative data was collected through the teacher's anecdotal records, the researcher's observations, the teacher's and children's interviews before and after the study and through children's postcards which they sent to their peers in Australia. The postcards included drawings and a written message composed of one or two sentences. Crook states [8], that this method of data collection is acknowledged as a valid data collection method, being "that the content of the children's drawings may provide insight into their thoughts and feelings about the world" (p. 49).

The research participants included eight children attending a school in Singapore. They were aged between 5 and 7 years. The Singapore school is a private, fee paying-school with a small teacher-student ratio. It is located in an urban suburb close to the centre of the central tourist/shopping district of Singapore. Some of the children were local Singaporean children but many had been resident in Singapore for less than 6 months and resided in urban suburbs in high-rise condominiums with communal grounds or houses with small gardens. A number of the children were experiencing a learning difference, which made the writing component of the postcard activity a challenge.

The data collection method included:

- each child was individually interviewed with a series of questions prior to the commencement of the Project. The information was used as the baseline data;
- the children were then directed to view the first set postcards from their counterparts in Australia;
- the children were then asked to respond to the first set of postcards by drawing and writing their own postcards which were sent to their peers in Australia;
- the children in Singapore replied to two more postcards (a total of three postcards);
- Observations were taken by the researchers and the teacher on comments and statements made by the children as related to the research question;
- cognitive engagement was indicated by individually re-interviewing each child with a series of questions;
- only non-prompted answers were entered into the data.

The observation of children's behaviour occurred in the normal classroom setting, as the recorded observations (what was seen and said), "*can reveal the uniqueness of each child, including temperament, regulation of emotions, and preferred mode of communication and expression*" [9] (p. 6). These observations were also validated as being made and confirmed by the class teacher who held a professional familiarity with the children at the school, and this familiarity assisted with interpreting various comments by the children. Due to the qualitative aspect of this element of a question, Mertens & McLaughlin [10], recommend five possible levels of participation by the researcher upon which to base observation of children. After due consideration, the Complete Participation model was used [10], whereby the researcher becomes a natural participant while also collecting data in the classroom setting. While this presented some logistical difficulties, the advantage of conducting the activity gave a measure of consistency contributing to the validity of the project. Observation is a major research resource when assessing reactions of young children [9]. In order to achieve data triangulation, the study used:

- the children's answers to the interview questions;
- the researchers' personal observations;
- the teachers' personal observations;
- research results of other studies in related areas; and
- policy documents and curriculum documents from various sources.

Baseline data was gathering through initial interviews. During the initial attendance at the school, the concept of receiving postcards from children in Australia was explained to the children in age appropriate language. Informed parental consent and agreement from the children to participate in this project was obtained. The children were then individually interviewed with a series of questions to ascertain their initial level of knowledge of their local natural environment and of sustainability.

It was recognized that there may be some limitations to the study. While the project primarily sought to measure any increase in awareness using a postcard exchange between children in each country to raise their environmental awareness, the researchers were cognizant of the following limitations:

- the absence of any direct teaching;
- the small number of children involved in the study;
- the limited duration of residing in Singapore for many of the children in Singapore;
- the age of the children (5-7 years) and their consequential limited ability for conceptual reasoning;
- the children’s limited ability to articulate their ideas in written and pictorial form; and
- the limited number of postcards involved in the study (3).

The data was collected and assessed and the findings analysed according to themes. In this way, other educators may be able to replicate any positive results. The next section discusses the findings of the study.

4. Findings

4.1. Qualitative and qualitative data

Data collection for the study included both qualitative and quantitative data. An overview of the qualitative data is presented in Section 4.2, Sections 4.3 and 4.3 present the initial and final interview summaries and Section 4.4 presents the classroom observations of the postcard activities and discussions. The quantitative data is presented in Section 4.5.

4.2. Qualitative data

The qualitative data collected for the Singapore section of the study included two sets of interviews, one initial interview conducted before the study commenced to ascertain children's level of awareness of their local natural environments and understanding of sustainability and a final interview after the production of the postcards to see whether this intervention had raised children's awareness of their local natural environments and understanding of sustainability. Classroom observations were also included to ascertain children's engagement in the project and to triangulate and support other collected data. The summary from Interviews 1 and 2 and the observations are presented in the next two sections.

4.3. Qualitative data: Interview 1- Initial Interview

Table 1 (below) shows a summary of Singapore children's initial interview. Children were asked seven (7) questions.

Table 1. Summary of Singapore children's initial interview

C h i l d	Q1: Define <i>environment</i>	Q2: Describe your area/ environment	Q3: What is the best thing about your environment?	Q4: Describe your concerns / worries about your environment	Q5: Do you prefer the inside or outside environment?	Q6: What do you know about Australian environments?	Q7: Would you like to know about other environments?
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I	Spoiling snow, flowers and animals	Describes house	Nil	Getting ill if water isn't clean	Inside - air conditioning	Animals, beach & farm	Yes
A	Outside	Loads of jasmine, water and plants	Pool & red plants	None	Outside – pool & running	No	Yes
J	Trees, leaves, grass	Children, trees grass & sun	Leaves	None	Inside – no mosquitoes	No	Yes
S	Sunny, flowers trees & food	Stars, moon & sun	Friends and family	None	Inside - air conditioning	Trees	Yes
K	Nil	Described condo especially security.	Nil	Nil	Both – toy inside & games outside	Plants, trees, leaves & grass	Yes
W	Nil	Trees, bushes flowers	Gardens & flowers	Bird get lost in jungle	Both – outside collect roots from tree	Nil	Yes
C	Trees, flowers, forests	Houses cars some trees	Nil	Nil	Inside – not allowed outside (Observation – “too hot to be outside”)	No	Yes
J	Described taking care of plants and animals	Described suburb and train system	Red flowers	Nil	Both – toys inside & searching for animals outside	Nil	Yes

The findings of the baseline data of the initial children in Singapore were as follows:

- 1 child referred to a “forest” in their definition of “environment”;
- 7 children were unable to define or give examples of types of environments;
- 8 children were able to describe the environment around their homes;
- 3 children referred to items in their natural environment as the best things in their environment;
- None of the Singapore children demonstrated any knowledge of, or referred to larger environmental concerns in Singapore or worldwide;
- 4 children preferred to play outside, of those, only 2 children demonstrated any interest in the natural environment;
- None of the children demonstrated any particular knowledge of Australian environments or the fauna and flora therein; and
- All the children demonstrated interest in learning about the environment in other countries.

After the third set of postcards was received from their counterparts in Australia, the seven remaining children were individually interviewed with a final series of questions to ascertain whether their level of knowledge had increased. Table 2 (below) shows a summary of Singapore children's final interview. Again, children were asked the same seven (7) questions.

Table 2. Summary of children's final interviews

Child	Q1: Define environment	Q2: Describe your area/ environment	Q3: What is the best thing about your environment?	Q4: Describe your concerns / worries about your environment	Q5: Do you prefer the inside or outside environment?	Q6: What have you learnt about Australia?	Q7: Would you like about this project? Any suggested changes?
I	Animals eat plants, plants get water	School, classroom, home	Describes house	Nil	Both Inside - ? Outside play with brother	Soccer, Rugby	Drawing Nil

J	Looking after the world	Dogs and TV	Dogs	No	Inside – no flies	You can feed kangaroos	Drawing No
S	The world has no rubbish	Keeping the world clean	Eat dinner with friends and family	None	Inside – air conditioning	Nil	Reading & writing Use stickers
K	World needs to be clean	Described building	Nil	None	Both – outside – running around	Nil	Nil puzzles
W	An area with animals	Described computer games	Trees & zoo fire trucks jungles in Africa No jungle in Singapore	Nil	Inside – computer games	Rugby	Drawing Nil
C	Lots of trees cut down. Plants and stuff.	Garden, trees	TV channels	None	Inside – got sick & now put off	Nil	Drawing ?
J	Keeping everything safe	Playing	MRT station especially the maps	None	Outside - plants	No	Drawing & writing No

The findings of the final interviews of the remaining seven children in Singapore were as follows:

- 1 child referred to an “area” in their definition of “environment”;
- 7 children were unable to define or give examples of types of environments, but they were observed to have a heightened awareness of the general concepts involved;
- 4 children were able to describe the environment around their homes;
- 2 children referred to items in their natural environment as the best things in their environment;
- None of the Singapore children demonstrated any knowledge of, or referred to larger environmental concerns in Singapore or worldwide and 1 child specifically said “there were no jungles in Singapore”;
- 3 children preferred to play outside, of those, only 1 child demonstrating any interest in the natural environment;
- 3 children claimed they had learnt something about Australia through the postcards with 1 child demonstrated some knowledge of Australia’s fauna and flora therein; and
- 6 children stated they had enjoyed the activities associated with making the postcards.

4.4. *Qualitative data: Observations*

The observations showed that there was generally a high level of emotional engagement in the discussion about the postcards as evidenced by the constant eye-contact. Also, there was generally laughter, smiling, joint attention and other displays of emotions. When undertaking the production of the postcards, the level of physical and verbal prompts required to undertake the required fine movements was minimal; all children were keen to draw and write a postcard in response to the ones they received from their peers in Australia. Most children required assistance with the written component of the tasks due to low levels of writing skill mainly attributed to their age. Observations gathered showed generally that the children actively participated in the postcard production and were not passively participating in the activity. In addition, the children stated they enjoyed participating in the project, moreover, one child suggested the use of stickers to “make the Australian children happy so they will draw more pictures” demonstrating a desire to continue to interact with their counterparts in Australia. Another child indicated that she would like to invite her 'friends' in Australia to visit her in Singapore.

4.5. *Quantitative data*

Tables 3-5 in this section present the quantitative findings by absolute number of children in each school who

included various items in their postcard drawings and message. These items were listed and counted for each postcard. Table 3 shows the number for each item drawn or mentioned by the 19 children from the Australian class for Postcards 1 to 3. It also shows the total number of items drawn or mentioned for the three postcards.

Table 3. Australian postcards correlated by item (19 children)

Items Drawn	Postcard 1	Postcard 2	Postcard 3	Total Items
Tree	21	13	9	43
Rainbow	5	2	-	7
Sky	18	16	9	43
Clouds	3	18	12	33
Sun	13	16	7	36
Grass	12	7	6	25
Rocks	-	1	7	8
Flowers	16	10	-	26
Vegetation	28	6	2	36
Dirt	-	1	-	1
Pond/water	5	5	5	15
Park	-	-	-	-
Beach	-	6	2	8
People	12	17	49	78
Pets	-	3	3	6
Wild Animals/birds	12	11	3	26
Gardens	6	-	-	6
Roads	1	1	3	5
Vehicles	2	4	8	14
Windows	34	29	6	69
Doors	13	1	2	16
Path	1	-	2	3
Swimming pool	-	2	1	3
House	19	1	1	21
Toys	-	1	1	2
Food	-	1	1	2
Garden Equipment	2	-	-	2
H/hold Equipment	-	-	19	19
Other buildings	-	13	5	18

Table 4 below shows the items drawn or mentioned by the eight (8) children from the Singapore class for Postcards 1 to 3. It shows the total number of items for Postcards 1 to 3.

Table 4. Singapore postcards correlated by item (8 children)

Items drawn	Postcard 1	Postcard 2	Postcard 3	Total Items
Tree	1	1	2	4
Rainbow	1	-	1	2
Sky	4	2	1	7
Clouds	10	11	5	26
Sun	7	5	2	14
Grass	4	-	-	4
Rocks	12	-	-	12
Flowers	4	2	1	7
Vegetation	4	-	-	4
Dirt	2	1	-	3
Pond/water	-	2	-	2
Beach	-	3	1	4
Star	-	-	1	1
People	7	19	27	53
Pets	1	1	-	2
Wild animals/birds	5	3	7	15
Vehicles	-	2	2	4
Windows	54	3	22	79

Doors	3	2	-	5
Condo	5	-	5	10
Path	4	-	1	5
Swimming pool	2	-	-	2
House	2	3	-	5
Toys	-	1	-	1
H/hold equipment	-	1	3	6
Other building	-	3	8	11

It can be observed from these totals, that overall, the Australian children included more natural (as opposed to man-made) items in their postcards than the children from the Singaporean school. This is further demonstrated in a direct comparison calculated by using the percentage of items used by each of the Australian and Singaporean children in their postcards. This comparison by percentage can be seen in Table 5 below.

Table 5. Comparison of Singapore and Australian postcard items by percentage

Items drawn	Singaporean school	Australian school
Tree	12.5%	94.7%
Rainbow	12.5%	36.8%
Sky	62.5%	94.7%
Clouds	62.5%	41.2%
Sun	87%	89.4%
Grass	50%	78.9%
Rocks	25%	5.2%
Flowers	37.5%	42.1%
Vegetation	37.5%	52.6%
Dirt	37.5%	5.2%
Pond/sea	25%	52.6%
Park	0.0%	0.0%
Beach	37.5%	31.5%
People	87.5%	78.9%
Pets	25%	21%
Wild Animals/birds	62.5%	47.3%
Gardens	0.0%	31.5%
Roads	0.0%	26.3%
Vehicles	25%	63.1%
Windows	87.5%	63.1%
Doors	50%	57.8%
Path	62.5%	15.7%
Swimming pool	37.5%	10.5%
House	50%	89.4%
Toys	12.5%	5.2%
Food	0.0%	10.5%
Garden equipment	0.0%	10.5%
H/hold equipment	25%	5.2%
Other buildings	75%	52.6%

Tables 3 to 5 reveal that in the Australian postcards, the children repeatedly represented trees, sky, sun, grass, water and general vegetation at a higher level than that which was represented in the Singaporean children's postcards. By contrast, the Singaporean postcards demonstrate a higher level of clouds, rocks, dirt, people, paths and swimming pools.

5. Discussion

5.1. Qualitative data and quantitative data

The qualitative data is analysed and discussed in Section 5.2, and the quantitative data is analysed and discussed in Section 5.3. The limitations of the study following the discussion of the data are in Section 5.4.

5.2. *Qualitative data*

From the data in Table 1 it is possible to infer that the Singapore children at the outset of the project had little knowledge of the concept of what constituted an 'environment'. They also had little knowledge of any local or worldwide environmental concerns or the need for environmental sustainability. These findings concur with other research which shows that there is a growing disparity between young children and their local, natural environments [1;2]. The Singaporean children also showed a limited desire to interact with the natural environment although this was mostly cited as due to climatic considerations, that being in a tropical location, the weather is mostly hot and humid in Singapore. The Singaporean children also showed a limited knowledge of other countries' environments, although they did articulate a unanimous interest in wanting to know about other country's environments.

From Table 2 data collected at the conclusion of the project, it is possible to infer that the Singapore children generally still had little knowledge of the concept of what constituted an 'environment' nor did they have any local or worldwide environmental concerns or the need for environmental sustainability. Further, they still showed a limited desire to interact with their local, natural environment. These concerns have been raised in previous research by Miles [1] and Louv [2]. The Singaporean children further showed a limited knowledge of the various environments within Australia.

The observations revealed that there was generally a high level of emotional engagement as defined by Hall, Maynes and Reiss [11] which was evidenced by the constant eye-contact. There was also generally a high level of emotional engagement in the project. This emotional engagement, as defined by Zigler [12], was evidence by laughter, smiling, joint attention and other displays of emotions. The data after the change was introduced seemed to concur with the research on emotional engagement and the link to cognitive development conducted by Zigler [12] in that children learn more when they are emotionally engaged in the activity.

Overall, the production of the postcards elicited a low level of physical and verbal prompts indicate a high level of enthusiasm and their active participation as defined by Kina [13] in the production of the postcards for their Australian peers. Overall, the children stated they liked participating in the project; moreover, one child suggestion of the use of stickers to "make the Australian children happy so they will draw more pictures" demonstrated a desire to continue to interact with their counterparts in Australia.

5.3. *Quantitative data*

Tables 3, 4 and 5 reveal that in the Australian postcards, the children repeatedly represented trees, sky, sun, grass, water and general vegetation more often than that what was represented by the children in the Singaporean postcards. The Singaporean postcards, by contrast, demonstrated a higher level of clouds, rocks, dirt, people, paths and swimming pools. As in excess of 85% of Singaporean residents live in high density buildings (high-rise apartments and condominiums) windows and other buildings were more strongly represented than in the Australian postcards. The level of houses represented in the Australian postcards also demonstrates that the children from both countries are influenced by what they see in their immediate environment. What was of initial interest in the project was that wild animals and birds were demonstrated more strongly in the Singaporean postcards than in the Australian postcards. Upon closer examination of the data, however, the higher levels of interest in wild animals and birds were due to some of the children drawing animals from the Singapore Zoo and the Singapore Aquarium rather than wild animals found in their natural environment. For the third postcard, the children were asked to draw a picture to illustrate the answer to "What is the best part about living in Singapore?" Again, children did not discuss their local natural environment. One child stated, "The best in Singapore is Sushi Tei" which is a restaurant chain in Singapore.

In addition, the postcards revealed that when asked what they do on the weekend, the Singapore children were more likely to be involved with man-made entertainment such as playing and swimming in the swimming pool of the condominium where they lived, visiting theme parks and food outlets rather than interacting with their local natural environment. This is particularly interesting given that Singapore has parks, jungle, forest, reservoirs and beach areas for public recreational purposes. By contrast, many more of the Australian children revealed, when drawing pictures for the Singaporean children about what they did on the weekend were more likely to draw themselves involved in outdoor activities such as going to the beach, fishing, crabbing (catching crabs) and boating. Both groups of children, in Singapore and in Australia live in similar tropical locations; both live by the sea with extensive rainforest, forest or jungle areas. Despite the similarities in their local, natural environments, the

Singaporean children were less engaged with their local, natural environment than the Australian children were. It is possible that this difference may be related to cultural differences or possibly that Singapore, as a large city with many shopping outlets, encourages such activities.

5.4. *Limitations of the study*

There were some limitations to the study. These include:

- the relatively small group of children from Singapore from which to gather data. This limits the ability to generalise the results to other children;
- the data relied on observations: whilst undertaken as objectively as possible, the artwork of some children was difficult to interpret, it is plausible that misinterpretation occurred; and
- many of the children at the Singapore school had only been in Singapore for a short period of time and were still culturally adjusting.

6. Conclusion and recommendations

The baseline data collected in the interviews of the eight (8) children (1 child relocated overseas during the project) indicated an initial lack of awareness of the children in their local, natural environment in Singapore. This is further evidenced in their interviews by their general lack of enthusiasm for playing outside mostly because of the hot, humid weather in Singapore. However, while the climate in Singapore is hot and humid all year round, the climate in Northern Australia where the Australian group of children live is similarly hot and humid for most of the year as both groups of children were living in tropical locations.

The teacher in Singapore stated in her initial interview that the children were explicitly taught about the environment and environmental sustainability. In addition, she stated that while the children may be unable to provide concise definitions but that the children were aware of the concepts. However, the comments, or lack thereof from the children do not consistently bear this out the teacher's expectations. Moreover, it must be noted that the majority of the children had recently moved to Singapore and were new to the school. The short duration of the children in Singapore might also explain the lack of knowledge about, and interest in, the Singapore environment.

To conclude, most of the data indicated that while children's awareness of sustainability and their local, natural environment increased through the activity, children in Australia were much more aware of, and interacted with, their local natural environments. Given the positive responses from the children, perhaps further research could be undertaken with a larger group of children over a longer time period. While this exchange of information between children is valuable, if the themes of the postcards were directed and linked with the curricula, it would be reasonable to expect a deeper understanding to be acquired by the children. In addition, given the age of the children, more positive results may occur with explicit teaching and parental interest and participation.

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