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Impact of Sustainable School Design on

Primary School Children's Environmental Attitude and Behavior

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Abstract:

This paper argues whether primary school children's environmental attitude and behavior is correlated with the sustainable design of their schools. 481 students were selected randomly from 3claimed sustainable designed and 3 conventional primary schools in Victoria, Australia. Data was collected through interactive keypads in groups of 50 each time. Analysis revealed that children, who are educated in claimed sustainable designed schools, possess higher pro-environmental attitude and more frequently behave environmental friendly compared to those in the schools with conventional architectural design. The paper also shows different environmental attitude and behavior based on gender differences.

Keywords: Primary school children, environmental attitude, environmental behavior, sustainable school design

Introduction:

As different disciplines favor various epistemologies, an interdisciplinary perspective facilitates the creation of original understandings that are formed via an integrated conception of what constitutes knowledge. This paper attempts to provide new understanding of the relationships between children's environmental attitude and behavior, and their sustainable school design.

From educational point of view, many researchers and organizations have tried to find the association between the environmental education and children's environmental awareness. Many international forums have stimulated the transformation toward sustainability. These include Tbilisi Declaration in1977 (a declaration to improve Environmental Education for environmental protection and the need for people's engagement in solving the environmental problems), Agenda 21 in 1992 (arose from U.N. Conference on Environment and Development in Rio de Janeiro, known as the Earth Summit), the Dakar Framework for Action in 2000 (as a world education forum which confirms that education is a fundamental human right and offers indispensable means for effective participation in the societies and economies of the 21st century

affected by rapid globalization), and the World Summit on Sustainable Development (WSSD) in Johannesburg in 2002 (Henderson & Tilbury, 2004). These commitments emphasize the educational reorientation and reforms toward sustainability. However, the correlation between the school design and children's environmental understanding has rarely been addressed from an architectural point of view(Uzun, 2009).

"It is believed that architectural settings can stimulate or subdue learning, aid creativity or slow mental perception. While trying to improve the quality of education with new curriculums, technologies and strategies, educators and policy makers must not forget the structures and spaces where our children go to school" (Meek, 1995, p. 67)

In fact, environmental learning has three dimensions. "Learning about the environment supports environmental understanding and knowledge; Learning for the environment is directed toward environmental stewardship and action; Learning in the environment encourages interactions and experiences in the environment" (Disinger, 1990; Murdoch, 1993). The three dimensions should be accessible through schooling for providing a comprehensive approach to children's environmental learning (Malone & Tranter, 2003).

This paper focuses on the third dimension of environmental learning, and emphasizes on the role of the school building in transmitting the environmental notions to children. It is hypothesized that students who are educated in a school with environmental design, possess higher pro-environmental attitude and more frequently behave environmental friendly.

Sustainable Architecture- Sustainable schools:

Sustainable Architecture is a concept, rising with the aim of protecting the environment from destructive effects of industrial era in the field of Architecture. With an increasing threat posed to the human health by environmental problems, environmental values have started to draw greater attention (Reid, 1995) .

Sustainable architecture awaken people's awareness of how a building interact with the environment; how much resources does it use and what are its effects on environment and people. Sustainable architecture also focuses on the role of buildings in protecting the environment from the increasing dangers of global warming, carbon emissions and ozone depletion. In other words, green building is a high performance building which is designed so that it has fewer impacts on the environment and human health, consume less water and energy, and coexist in harmony with the environment. Green buildings also "reduce the life-cycle environmental impacts of the material used" (Yudelson, 2008, p. 13).

Since a sustainable school can support students to meet the uncertainties of future years, addressing sustainability in schools is critical (Zurita, 2008). Although there are many initiatives of sustainable schools, few studies have focused on the school buildings. School buildings are not just physical structures. They nurture students with a silent language through their spatial

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arrangement and building design. "Buildings that perform well in terms of environmental impact offer a perfect opportunity to use the building as a teaching tool" (Newton, Wilks, & Hes, 2009). A school building is an expert teacher itself, and children are inspired by the school design as much as the curriculum. *The Department for Children, Schools and Families* (DCSF) in UK recommend that "by 2020 all schools manage and , where possible, design their buildings in ways that visibly demonstrate sustainable development to everyone who uses the school" (Department for Children, 2008). So architecture can transmit deep environmental values especially to children, and facilitate the marriage of school building and education.

As Ann Taylor points out *visual literacy* is one of the most important issues that should be considered in children's environmental worldview. She is one of the protagonists in this field which discuss about the "knowing eye" in her book (Taylor & Enggass, 2010). She believes that knowledge can be transferred through the vision. And that is why this study focuses on school building design as one of the most critical parameters in enhancing children's environmental world view. Figure 1 shows some of the features of a sustainable school design (such as tangible landscape, visible water tanks, and outdoor classrooms) that contribute to students gaining some environmental worldview. The landscape of this sustainable school is architecturally designed so that children can sit on the small rocks just beside the artificial lakes and feel the coldness of the water or even play with different water creatures like turtles and small fishes.

Figure 1-Sustainable school Design

Methodology

Although there are many variables in a school which children's understanding of environment can be affected by, investigating how "school building design" can impact children's understanding of environment needs special consideration. There are a few questions to be answered:

-Is children's environmental attitude in sustainable schools significantly different from children's environmental attitude in Conventional schools?

-Is children's environmental behavior in sustainable schools significantly different from children's environmental behavior in conventional schools?

-Is there any correlation between "children's environmental attitude and behavior "and their "gender"?

To answer the above questions, a questionnaire was developed mostly based on existing scales in the environmental attitude and behavior literature, NEP(Bechtel, Corral Verdugo, & de Queiroz Pinheiro, 1999; Dunlap, Van Liere, Mertig, & Jones, 2000; Manoli, Johnson, & Dunlap, 2007) and GEB(Kaiser & Wilson, 2000, 2003).

NEP **(New environmental paradigm)**

"New ecological paradigm(NEP) is the most widely used instrument for studying environmental orientation among adults" (Manoli, et al., 2007). This scale was developed by Dunlap and Van Liere around 35 years ago in 1978 for the first time. Unlike the previous environmental scales which mainly focused on respondent's attitude toward specific problems such as energy consumption, waste disposal, air/water pollution (Albrecht, Bultena, Hoiberg, & Nowak, 1982), Dunlap and Van Liere broaden their investigation to a more general position about the environment among American population (Noe & Snow, 1990b).

One important issue about a scale is reliability and this has also been approved for NEP (Noe & Snow, 1990a; Vining & Ebreo, 1992). Another issue that had to be considered while finding an appropriate instrument was associated with cross-cultural applicability. Since this study is conducted in Australia, the instrument should be matched with the cultural and social specification of the country. Literature reveals that "the NEP scale has been administered in ethnic and cross-cultural studies seemingly without problems in translation" (Noe & Snow, 1990a).

There are few other instruments for measuring children's environmental attitude. The "Children's Attitude toward the Environment Scale" (CATES) is one of them. This instrument has an unskillful bipolar answer structure and is not commonly used. Another instrument which is more popular is "Children's Environmental Attitude and Knowledge Scale" (CHEAKS). It assesses attitudes through verbal commitment, actual commitment, and affect. This scale also measure children's environmental knowledge. "These instruments measure different dimensions than NEP scale"(Manoli, et al., 2007).

Regarding the dimensionality of NEP, it worth noting that Dunlap and Van Liere believed that the NEP scale measured a single dimension , while others have found that it measures two, three or even four dimensions (Bechtel, et al., 1999; Edgell & Nowell, 1989; Furman, 1998; Gooch,

1995; Hammitt & Noe, 1992; Noe & Snow, 1990a, 1990b; Roberts & Bacon, 1997; Scott & Willits, 1994; Shetzer, Stackman, & Moore, 1991).

To adapt NEP for children, Manoli et al. concluded that NEP scale with 10 items instead of 15 items (in adult version) with few changes in wording would be appropriate for children in age range of 10-12 years old. They believe that NEP for children could be considered a 3 dimensional scale (Right of nature, Eco-crisis, and human exemptionalism). They also argued that it is possible to treat it as a uni-dimensional scale (Manoli, et al., 2007).

GEB (General Environmental Behavior)

Literature shows that environmental behavior assessment can be complicated. Environmental behavior can be assessed with self-reported measures (e.g. interviews and/or questionnaires), or rating scale and observation (Erdogan, Ok, & Marcinkowski, 2012). Hines et al. pointed out that the majority of the 128 research studies that they reviewed were self reported (Hines, Hungerford, & Tomera, 1987) which can be considered as a limitation of those studies. One of the main reasons for avoiding observation as a method of data collection in those studies is the large number of the sample size. This study has also chosen the self-report method for gathering the data.

GEB was developed by Kaiser and associates and it measures individual involvement in variety of environmental behavior from simple behaviors to the issues need more commitment and sacrifice. "Kaiser has repeatedly demonstrated the superiority of this Rasch model scale to other environmental behavior assessments because of its inclusion of items that vary along a continuum of attitudes and the feasibility of behavioral engagement" (Evans et al., 2007), unlike other behavior scales that assume the frequency of engagement in all behavioral items are similarly distributed(Bond & Fox, 2007).

One of the positive points of children's behavior scale is asking children about their actual actions in daily life in which environmental consideration can be an issue. For example, there is no item, questioning children about phosphate-free detergents, prewashing the cloths, or chemical toilet cleaners which are more pertained to the environmental behavior of adults.

Correlation of the environmental attitude and behavior

"Progress toward solving environmental problems is likely to depend on ecologically conscious consumer behavior more so that environmental concern"(Roberts & Bacon, 1997), however, it is not clear yet whether possessing environmental attitude results in behaving pro-environmental or not. Some researchers argue that the compatible behavior with the environmental attitudes is lacking (Ritchie, McDougall, & Claxton, 1981; Verhallen & Van Raaij, 1981; Webster Jr, 1975). Evan et al. found that there is no correlation between children's environmental attitude and environmental behavior and the reason "could be their truncated set of behavioral options for engagement in ecological behaviors" (Evans, et al., 2007). When these limitations are removed,

the correlation between the attitude and behavior grow considerably (Collado & Corraliza, 2012; Kaiser & Gutscher, 2003). Others have found a moderate (Hines, et al., 1987) relationship. Many pointed out that individual with higher ecological concerns should be more likely to possess more environmental consumer behavior (Antil, 1984; Shetzer, et al., 1991).However, the range of such behaviors are quite vast, environmental concerns may also encourage some behaviors more that others(Roberts & Bacon, 1997). Strong correlation between the pro-environmental concerns and pro-environmental behavioral intentions has also been reported (Shetzer, et al., 1991).

Pilot-testing and internal consistency

A questionnaire was designed taking into account the children age as well as the school context in Australia. The questionnaire is based on NEP and GEB scales. Some questions were added to these two scales to adapt it with the hypothesis and the goals of this study. A pilot study is organized to test the response rate and the applicability of the redesigned questionnaire in children's environment.

Before starting the data collection, a few primary school teachers were asked to revise the questionnaire in terms of wordings if it is needed in their point of view. Using experts is one way to ensure content validity of the instrument(Hungerford, Peyton, & Wilke, 1980). Teachers are more familiar with the children's language and wordings as they are trained in this field and they have interaction with children for considerable hours per day, so they have clearer idea of the children's comprehension of the subject. After receiving primary school teacher's feedbacks and applying a few changes, the researchers asked two university lecturers to put their comments on the questionnaire as well.

The pilot study took place in Geelong East primary school. During the first set of data collection in Geelong East Primary School, Grade 4, 5, and 6 students (10-12 years old) were asked to make comments on the difficult terms and any ambiguity they might face.

Some questions were found to be unclear for the children. Some of the uncertainties have been removed by giving more examples and verbal descriptions. Certain questions related to behavior were not applicable in particular schools (e.g. turning tap off where automatic taps were in place). Since this issue was not the case for all primary schools, the questions with these characteristics were kept in the scale, and as the main concern of the researcher was to track children's behavior in the mentioned situation, in such a cases children were asked to think about the same behavior at home.

Keypads were used to digitally record children's answers, and they were particularly useful for encouraging students to respond within a time frame. By using the keypads the children were also highly involved and the process maintained young children's attention for the most length of responding time.

So, researcher developed an environmental assessment tool for children "that does not suffer from inclusion of items outside of children's volitional control and was derived from more contemporary sets of environmental issues and problems"(Evans, et al., 2007) than other older scales.

Main study

The sample population was chosen from two different types of schools: environmental designed schools and conventional schools in Victoria, Australia. After getting approval from Department of Education and Early Childhood Development (DEECD) and also Human Research Ethics Committee (DUHREC), researchers started to contact the primary schools randomly.

The criteria for differentiating environmental designed schools from conventional schools was having the *5-star certificate*. So, 3 sustainable schools were selected randomly from the identified environmental schools based on the mentioned criteria.

ResourceSmart AuSSI Vic is a program which "provides a holistic approach to sustainability in schools. It integrates educational, environmental, social and economic outcomes as components of the bigger picture of sustainability"(Government, 2011). This program has defined five modules of Core, Biodiversity, Energy, Water and Waste and awards the five-star sustainability certification to the sustainable Schools in Victoria, Australia.

Sample population:

Since "early attitudes and knowledge shape the later thinking of adolescents and adults"(Leeming, Dwyer, & Bracken, 1995), it is very critical to nurture pro-environmental children. This study focuses therefore on children as a sample population.

Primary school children from grade 4, 5, and 6 of 10-12 years old were selected to answer the survey. 94 students from 3 conventional schools and 378 students from 3 environmental designed schools attended to the survey. From the total 481 sample size, 258 students were female and 223 were male. 197 participants were in grade 4, 124 in grade 5, and 160 in grade 6.

	Grade 4		Grade 5		Grade 6	
	Female	Male	Female	Male	Female	Male
Environmental designed schools	81	83	47	46	72	58
Conventional schools	22	11	14	17	22	8
Total	197		124		160	

At primary schools:

Each school allocated almost 45 minutes for each set of data collection. Because of the limited number of the keypads, data from maximum 50 students at a time was collected. After a couple of tests (practices), it was found that this number is an appropriate number in each set, as one

would not be able to control more numbers of the primary school students at once, even with the teachers' supervision.

In each set of data collection, the researchers ensured that all children understood the data is anonymous and the child could terminate attending the survey at any time without any consequences. Children were asked to select their answers carefully as the selected answer could not be cleared. Therefore, the software only accepts their first click, and they should first think and then select. They were also reminded to feel free to ask for more explanation if any question is not clear and the researchers were happy to explain it several times to ensure comprehensibility. These measures helped to make a constructive and friendly environment in which children were able to ask questions if required.

Since the keypads were a new device for almost all students, they were all very enthusiastic to attend and continue and nobody requested to terminate the procedure in the middle.

Analysis

481 students attended the survey. Collected data met the assumption of the normality and being parametric. Therefore, an independent sample t-test was conducted to know if there is any significant difference between the environmental attitude and behavior of the children in two different types of schools.

Children's environmental Attitude:

To run the t-test, type of the school design (sustainable/ conventional) was considered as the categorical, independent variable, and children's environmental attitude was considered as the continuous dependent variable. T-test output revealed that there was a significant difference in the children's attitude scores in questions number 2, 3,5,10,12,14,16.

Question 2	Environmental schools (M= 3.08, SD=1.39) and Conventional schools (M= 2.54, SD=1.25; t (479) = 3.411, p=.001, two-tailed).
Question 3	Environmental schools (M= 3.81, SD=1.138) and Conventional schools (M= 3.29, SD=1.30; t (129.738) = 3.571, p=.000, two-tailed).
Question 5:	Environmental schools (M= 4.13, SD=1.105) and Conventional schools (M= 3.69, SD=1.245; t (479) = 3.399, p=.001, two-tailed).
Question 10	Environmental schools (M= 3.69, SD=1.092) and Conventional schools (M= 3.15, SD=1.182; t (471) = 4.109, p=.000, two-tailed).
Question 12	Environmental schools (M= 3.89, SD=1.252) and Conventional schools (M= 3.25, SD=1.479; t (126.511) = 3.883, p=.000, two-tailed).
Question 14	Environmental schools (M= 3.32, SD=1.45) and Conventional schools (M= 3.67, SD=1.30; t (149.608) = -2.272, p=.025, two-tailed).
Question 16	Environmental schools (M= 3.95, SD=1.208) and Conventional schools (M= 3.53, SD=1.401; t (123.603) = 2.639, p=.009, two-tailed).

Although the magnitude of the differences in the means for all mentioned questions was small (the largest eta squared= .038), the following graph represents that environmental school mean scores are higher than conventional schools in almost all items- Showing that children in

environmental schools possess more pro-environmental attitude compared to conventional schools. The only two exceptions are Q7 and Q14.

According to the below graph, mean score of environmental-schools for Q7 and Q14 appears to be lower than conventional schools. T-test showed that Q7 has p=.052 which is not significant. The mean score for Q14 is significantly different and lower than the conventional schools. Since the scale was a Likert type scale (from 1-Strongly disagree to 5-strongly agree), the higher mean score represent possessing more pro-environmental attitudes. Q14 (It does not make me feel bad to use recycled water for watering the garden) is asking a question which students in conventional schools may not have any discretion or sense over it, and probably that is why they don't feel bad about using recycled water. They might not experienced using the recycled water before, but almost all environmental designed schools collect the rain water in big water tanks and use it for irrigating the school gardens. So the students in these kinds of schools have experienced that the color of the water may not be clear, it can be smelly, and it may seem dirty and full of germs, and this cause a kind of bad feeling for them.
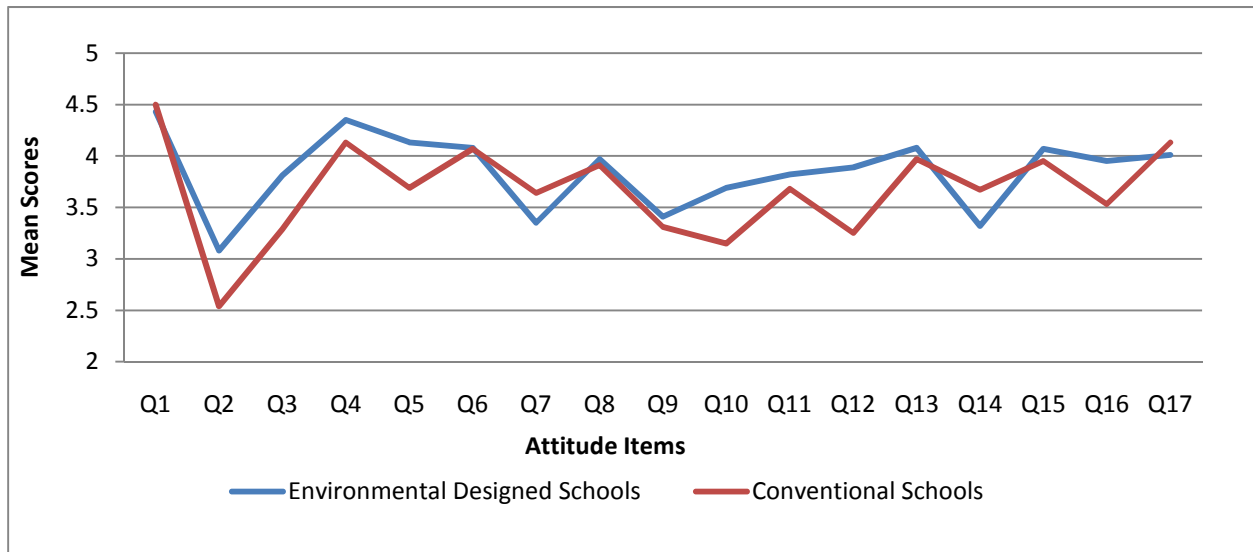

Figure 2: Environmental Attitude of Children in Environmental and Conventional Primary Schools

Children's environmental Behavior:

To investigate if children's environmental behavior is significantly different in environmental and conventional schools, an independent sample t-test was conducted. In this test, type of the school was considered as independent variable, and children's environmental behavior was considered as dependent variable. Output shows that there is significant difference in Q1, Q2, Q7, and Q8.

Question 1	Environmental schools (M= 3.66, SD=1.26) and Conventional schools (M= 3.27, SD=1.17; t (477) = 2.70, p=.007, two-tailed). (Eta squared= .0150)
Question 2	Environmental schools (M= 2.29, SD=1.45) and Conventional schools (M= 1.88, SD=1.15; t (172.662) = 7.787, p=.000, two-tailed). (Eta squared= .112)
Question 7	Environmental schools (M= 2.71, SD=1.43) and Conventional schools (M= 2.29, SD=1.31; t (476) = 2.625, p=.009, two-tailed). (Eta squared= .014)
Question 8	Environmental schools (M= 4.25, SD=1.27) and Conventional schools (M= 4.63, SD=.99; t (169.986) = -3.089, p=.002, two-tailed). (Eta squared= .022)

The magnitude of the differences in Q1, Q7, and Q8 are small, but there is a large difference for Q 2(Eta squared= .112). This question asks if children work in the school garden with their teachers. Working in the schools garden in environmental schools are part of their curriculum. Sustainable design of these schools provides the infrastructure for children to be able to roam around the school garden and feel the sense of nature and smell the nature aroma. Example of this is the St Macartan's primary school which is one of the environmental schools of this study. Children regularly go to the special garden of the school and plant some fruits (such as strawberry, cucumber, and tomato) and veggies (Parsley, cabbage, lettuce), and work with their teacher (Figure 3).

Figure 3: Student working with teachers in the school garden

Q1 discuss about *participating in recycling activities in the school* and Q7 is about *looking at books about the environment*. Both of these behaviors are encouraged very much in environmental schools. Although in both types of schools in Australia children manage their recyclable and rubbish waste, and help to empty their little class bins into large yellow, green, and red bins, but no further recycling activities take place in Conventional schools. From that stage, council will collect the waste bins and continue the recycling process. While environmental schools have a special space in their school landscape for the compost bins and the worm farms (Figure 4), and this is student's job to make compost from their food leftovers, school gardening wastes and other useful components and take care of their worm farms with

teacher's supervision. Therefore, it is concluded that environmental school design provides formidable context and structure to support children's environmental behavior and provide the opportunity for experiencing some environmental features.

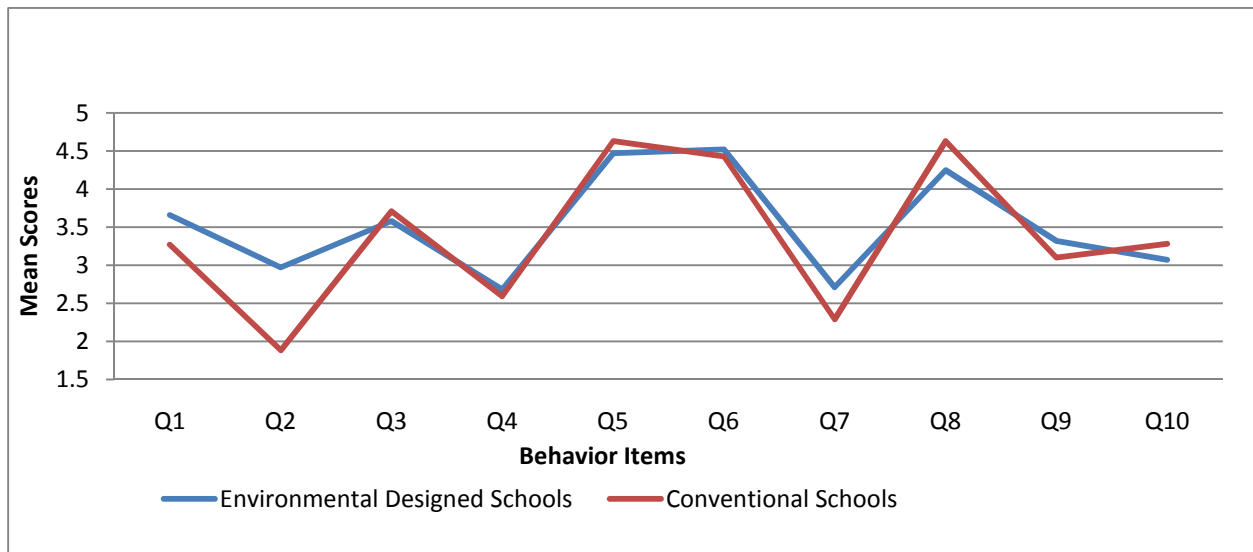Figure 4: Worm farms, compost and recycling bins

Figure 5: Environmental Behavior of Children in Environmental and Conventional Primary Schools

Figure 5 compares the mean score of the children's environmental behavior in two types of schools. It indicated than the mean of the Conventional schools are lower than the environmental schools for almost all questions except Q8 (*I DO NOT leave the class window open while the heater is working*). Interestingly, the mean score of conventional students in this behavioral item is higher and significantly different. Further investigation revealed that in most environmental schools the class windows can not be adjusted as they have an electronic louvered windows that opens or closes automatically according to the room temperature. Therefore, having the lower mean in this item does not mean that the children in environmental schools don't care about the energy usage.

Figure 6: Automatic Louvered Windows

Gender attitude differeneces:

Taking one further step, an independent sample t-test was conducted to compare the children attitude scores for females and males. There were significant differences between males and female students in the attitude questions of 1, 4, 7, 12, 16, and 17 scores.

Question 1	Females (M= 4.61, SD=.742) and Males (M= 4.26, SD=1.152; t (368.841) = 3.926, p=.000, two-tailed). (Eta squared= .0311)
Question 4	Females (M= 4.46, SD=.874) and Males (M= 4.13, SD=1.188; t (402.154) = 3.437, p=.001, two-tailed). (Eta squared= .024).
Question 7	Females (M= 3.55, SD=1.26) and Males (M= 3.24, SD=1.48; t (434.456) = 2.433, p=.015, two-tailed). (Eta squared= .012)
Question 12	Females (M= 3.92, SD=1.23) and Males (M= 3.59, SD=1.402; t (434.384) = 2.658, p=.008, two-tailed). (Eta squared= .014)
Question 16	Females (M= 3.98, SD=1.143) and Males (M= 3.73, SD=1.367; t (428.516) = 2.164, p=.031, two-tailed). (Eta squared= .009)
Question 17	Females (M= 4.14, SD=1.128) and Males (M= 3.90, SD=1.304; t (432.208) = 2.063, p=.04, two-tailed). (Eta squared= .008)

Although the magnitude of the difference in all items were small, results show that female environmental attitude mean scores are higher than Males in almost all items, indicating that girls have more pro-environmental attitudes comparing to boys(Figure 7).
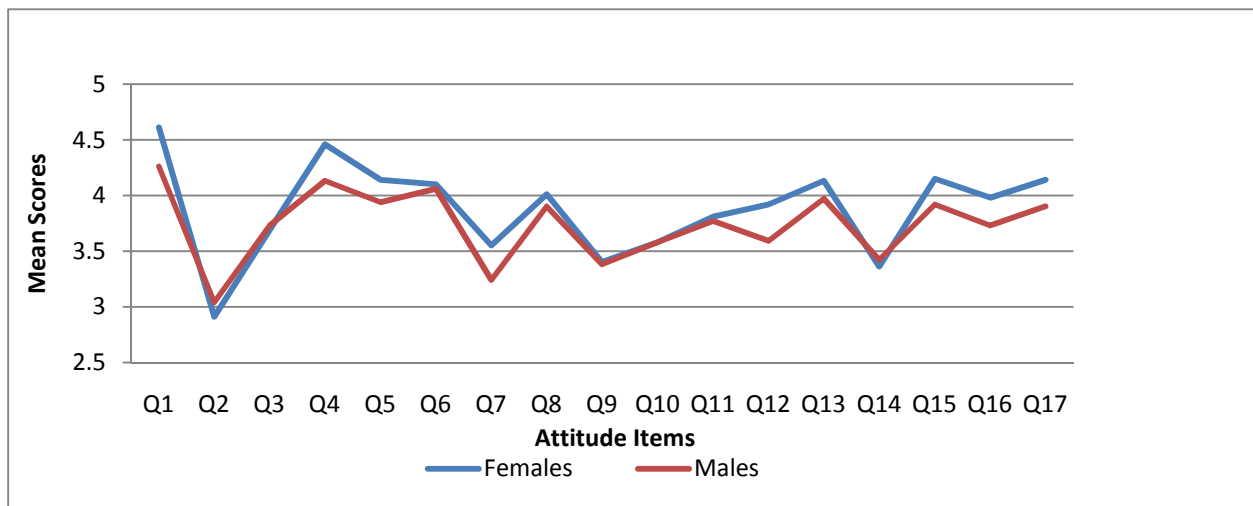

Figure 7: Female and Male students' Environmental Attitude

Gender Behavior Differeneces:

T-test shows that there are significant differences in female and male environmental behavior for Q1 and Q2.

Question 1	Females (M= 3.77, SD=1.176) and Males (M= 3.38, SD=1.308; t (477) = 3.419, p=.001, two-tailed). (Eta squared= .023)
Question 2	Females (M= 2.92, SD=1.398) and Males (M= 2.57, SD=1.514; t (453.732) = 2.610, p=.009, two-tailed). (Eta squared= .014)

Figure 8 shows that female students possess higher environmental behavior mean scores compared to males for all questions indicating that female students behave environmental friendly more often than their male peers.
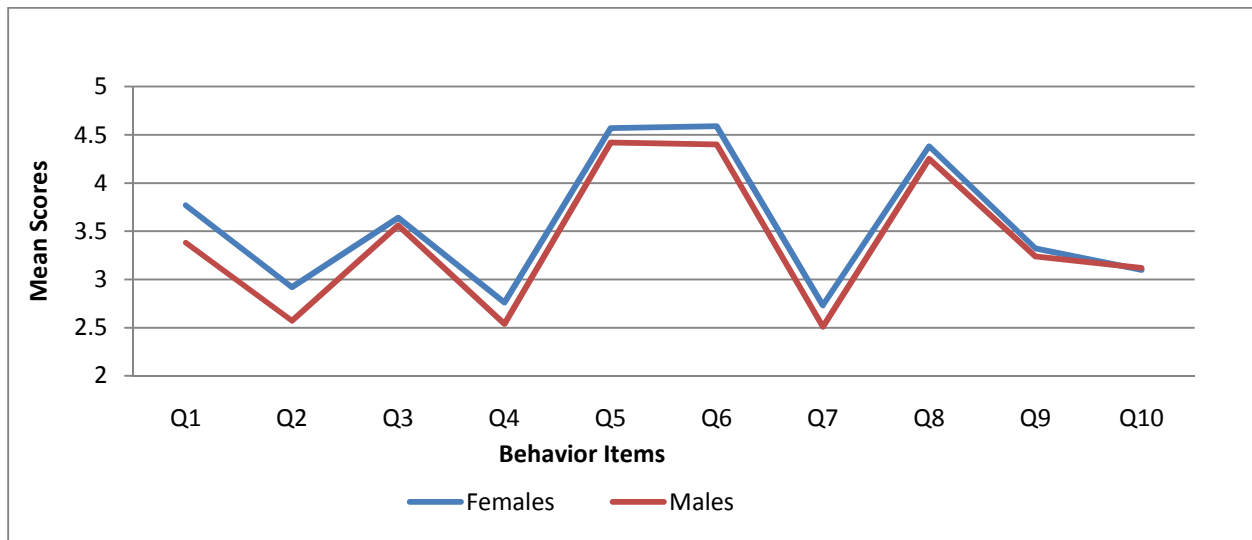

Figure 8: Female and Male students' Environmental Behavior

Conclusion

This paper investigates the effect of sustainable school design on children's environmental attitude and behavior. This exploratory research also investigated the children's environmental attitude and behavior differences based on gender. Researchers adopted the NEP and GEB for children scales and added a few questions to match them with the context of this study.

Using these two valid scales, 481 grade four, five and six students in two different types of primary schools(environmental and conventional) attended the survey. Environmental schools were selected based on *ResourceSmart AuSSI Vic* program criteria which awards five- star certificate to sustainable schools. After identifying the sustainable schools 3 of them were selected randomly for data collection. Conventional schools were also selected randomly from the primary schools in victoria.

The findings reveal that there is significant difference in children's environmental attitude in two different types of schools . Comparing the means of those questions which have significant

difference shows that in all of them environmental schools have higher scores compared to conventional schools. There is one exception though in Q14 which ask about using recycled water in the school. Children in sustainable schools experience some features of sustainability- such as compost bins and recycled water from the school roof for flushing the toilet or watering the garden- which are very desirable in terms of environment , but not very pleasant for students to use. Our interpretation is that because children in conventional schools have no discretion and direct experience about these aspects, their scores have become higher.

Behavior scores were also higher in environmental schools with an exception in Q8 which is about opening or closing the class window. The essence of the sustainable design defines some of the children's behaviors in environmental schools. Having automatic windows, water taps, and lightings make some restrictions in terms of controling freedom. Children have not the choice to adjust and manipulate the windows. That is why they selected lower scores in 1:Never to 5:always spectrum, while students in conventional schools don't have automatic windows and they adjust the openings according to the classroom temperature when needed.

We also found that female students have higher mean scores compared to male students in 10-12 years old in terms of environmental attitude and behavior. This finding is very important and worth conducting more research as almost half of the school participants are boys.

In conclusion the result of this research suggest that sustainable school design in fact creat a dialogue between children and the school building and infrastructures it provides that contributes generating opportunities for improving young generation environmental worldview.

The Australian government has invested in environmental education and devised measures for sustainable primary school buidings. Although the measures could enhance children's environmental attitude and behavior in recycling, loving nature and working in the school garden, not enough consideration was given to the school building itself. Therefore, it is crucial to revelutionize the primary school buiding design to encourage children's understanding of environment.

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School Name:	Teacher's Name:	Grade: 4 ☐ 5 ☐ 6 ☐
Gender: Female ☐ Male ☐	How long have you been in this school?	

Environmental Attitude:

Scale Item:	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1. Plants and animals have as much right as people to live.					
2. There are too many people on earth.					
3. Clever people will prevent the Earth from being ruined					
4. People must still obey the laws of nature.					
5. When people mess with nature it has bad results.					
6. Conscious people will protect the environment from degradation.					
7. Nature will survive even with our bad habits on Earth					
8. People are supposed to rule over the rest of nature.					
9. People are treating nature badly.					
10. At some stage people will know enough about how nature works to properly manage it.					
11. If things don't change, we will have a big disaster in the environment soon.					
12. I would be willing to go to a school which has a focus on nature.					
13. I believe that light in classrooms should be generated by solar panels (electricity).					
14. It makes me feel bad to use recycled water for watering the garden.					
15. I would be willing to grow food in the school garden.					
16. I feel more connected with nature when classes are held in outdoor spaces.					
17. It makes me feel better when we have natural day light rather than artificial light all day in classrooms.					

Environmental Behavior:

Scale Items:	Never	Seldom	Sometimes	Usually	Always
1. I participate in recycling activities at School.					
2. I work in the school gardens with teachers.					
3. I forget to turn lights off when I leave a classroom.					
4. I pick up litter left behind by my friends during recess and lunch breaks.					
5. I forget to turn off water after washing my hands in the school toilets.					
6. I bring too much food to school and I have to throw away the extra food.					
7. I look at books about the environment (nature, trees, and animals)					
8. I leave the class window open while the heater is working.					
9. I turn on the air conditioner rather than opening the glass window when it is warm inside.					
10. I don't turn on the classroom lights because there is always enough light in my classroom.					