

2015

The Role Of Motivation And Curriculum In Shaping Pro-Sustainable Attitudes And Behaviors In Students

Kathleen Bamford
University of Vermont

Follow this and additional works at: <https://scholarworks.uvm.edu/graddis>



Part of the [Environmental Education Commons](#), and the [Sustainability Commons](#)

Recommended Citation

Bamford, Kathleen, "The Role Of Motivation And Curriculum In Shaping Pro-Sustainable Attitudes And Behaviors In Students" (2015). *Graduate College Dissertations and Theses*. 326.
<https://scholarworks.uvm.edu/graddis/326>

This Thesis is brought to you for free and open access by the Dissertations and Theses at ScholarWorks @ UVM. It has been accepted for inclusion in Graduate College Dissertations and Theses by an authorized administrator of ScholarWorks @ UVM. For more information, please contact donna.omalley@uvm.edu.

THE ROLE OF MOTIVATION AND CURRICULUM IN SHAPING PRO-
SUSTAINABLE ATTITUDES AND BEHAVIORS IN STUDENTS

A Thesis Presented

by

Kathleen Bamford

to

The Faculty of the Graduate College

of

The University of Vermont

In Partial Fulfillment of the Requirements
for the Degree of Master of Science
Specializing in Natural Resources

May, 2015

Defense Date: March 31, 2015

Thesis Examination Committee:

Thomas Hudspeth, Ph.D., Advisor
Thomas Macias Ph.D., Chairperson
Leon Walls, Ph.D.
Adrian Ivakhiv, Ph.D.

Abstract

Sustainability is an area of growing pertinence as our future and the future of our planet depends on its acceptance and application. Determining patterns in pro-sustainable attitudes and behaviors, and revealing motivations behind these behaviors have important implications for the future of sustainability education. The primary objective of this study is to discover the relationships between educational experience and sustainability attitudes and behaviors in elementary school students. A secondary objective is to determine the motivation behind pro-sustainability behaviors and to establish the role this plays in educational programs. The study utilizes mixed methodology through two modes of data collection: 1. Student surveys, and 2. Teacher questionnaires. The surveys are self-report and were analyzed quantitatively to determine patterns. Ninety seven students (63 from a school with sustainability based curriculum, Sustainability Academy at Barnes (SAB), and 34 from a general curriculum school without a specific sustainability focus, CP Smith) in grades 3-5 completed a 20 question survey which measured sustainability attitudes and behaviors. Students involved in a sustainability education program scored higher on every indicator, and highest and lowest indicators for attitude and behavior were the same for both schools, showing distinct areas of strengths and needs. The average mean scores for attitudes were higher than the average mean scores for behavior for both schools. SAB students had a significantly higher amount of correlations between attitudes and behaviors than C.P Smith students did. The questionnaires are qualitative and are structured, with open ended responses. The questionnaires were completed by the five teachers of the SAB students who completed the survey. The eighteen questionnaire questions are focused on what sustainability means to the teachers, how it is used in their curriculum, and perceived student sustainability attitudes/behavior. Social justice was the most mentioned concept relating to sustainability. Other important factors were: community, opportunity, adult role models, and socio-economic barriers to sustainable attitudes and behaviors. Students from the sustainability focused program seemingly hold both sustainability based attitudes and behaviors as a higher priority; however, the schools had the same areas of needs. Future sustainability education curriculum would benefit from focusing on transportation and alternatives to consumption. Also, attitudes towards recycling/reusing and borrowing have shown to be closely tied to attitudes in other areas of sustainability; therefore, strengthening attitudes in these areas will likely affect attitudes across sustainability. A cross curricular sustainability program with a focus on social justice issues and experiential learning, experienced with strong role models, appears to develop students with more advanced sustainability attitudes and behaviors than programs with no sustainability curriculum.

Table of Contents

Chapter 1: Introduction 1
Chapter 2: Literature Review 4
Chapter 3: Methodology 12
Chapter 4: Results 16
 Surveys 16
 Questionnaires 31
Chapter 5: Discussion 34
Conclusion 42
Appendices 45
Bibliography 47

Chapter 1: Introduction

Sustainability is an issue gaining ever-growing attention and immediacy.

Understanding the motivation behind pro-sustainable attitudes and behaviors will provide crucial knowledge that could help shape sustainability education in order to develop future proponents of sustainability. This issue is one of global proportions. There is not a community untouched by unsustainable practices and this will only be getting direr in the coming decades, especially when considering current climate change predictions.

Ascertaining the key factors of sustainable behavior is essential for the growth of the sustainability movement and for efficacious education.

Current research on pro-environmental behavior motivation has given some clues to how to further develop individuals' commitment to sustainability. Ascertaining how this knowledge is and can be applied to education will give our next generation an early start on developing sustainable communities. Also, determining what areas of sustainability education are lacking will help guide future focus of education to ensure comprehensive sustainability programming.

The primary objective of this study is to discover the relationships between educational experience and sustainability attitudes and behaviors in elementary school students. A secondary objective is to determine the motivation behind pro-sustainability behaviors and to establish the role this plays in educational programs. This research is necessary as understanding what experiences motivate children to develop pro-sustainability attitudes and behaviors is crucial to the adaptation of human behaviors to an ever changing environment. In addition, data on precisely how sustainability education

impacts the attitudes and behaviors of young children will provide information on how to create these attitudes in students in schools without sustainability programs. Finally, analyzing teacher attitudes and behaviors will provide even more insight on how the delivery of the curriculum and those who are delivering it may be affecting the students' attitudes and behaviors.

The research questions I attempted to answer were: 1. What are the key differences in attitudes and behaviors of children involved in sustainability education as opposed to those who are not?, 2. How are current school programs (those with a sustainability focus and those without) shaping, and possibly motivating these attitudes and behaviors? 3. What areas of sustainability is education succeeding and which are areas which need more attention? I hypothesize that: 1. students in a sustainability focused educational program will develop more advanced sustainability attitudes and behaviors than students from traditional institutions, 2. that for both groups attitude scores will be higher than those of behavior, 3. that there will be distinct areas which are being well covered in both sustainability focused and traditional schools and also distinct areas which will need more attention, 4. I predict that sustainability focused programs will have an integrated curriculum approach, expose children to the natural world and have adults serving as sustainability minded role models, and 5. I hypothesize that sustainability education considers motivational factors in its curriculum.

It is known that Environmental Education has shown increase in standardized test scores, overall academic achievement and ecological understanding when compared to schools with no sustainability component (Louv, 2005). There is less evidence regarding

what the specific areas of strengths and weaknesses are in sustainability education, and how motivation can be used to enhance these programs. It has also been determined that individuals exhibiting Responsible Environmental Behavior have had previous meaningful experiences, particularly with natural places and influential people (Chawla, 2005 & 2007), but we need more information on how the schools are providing these experiences specifically in the domain of sustainability. If the factors which motivate pro-sustainability behavior can be uncovered, and more precise knowledge of less efficacious areas of sustainability can be determined, sustainability education in the future can benefit from these understandings.

Chapter 2: Literature Review

Determining motivators for environmental behavior can be a difficult process, which makes creating a framework to evaluate these behaviors complex (Kolmuss & Agyeman 2002; Stern, 2000). Kolmuss & Agyeman (2002) posit that knowledge and awareness do not necessarily translate into pro-environmental behavior; rather attitudes influence intention which helps shape actions. Arbuthnott (2012) found that a medium to large change in intention associated to only a small change in behavior, discovering a weak correlation between intention and behavior. Intent is only of several factors attributed to pro-environmental behavior. Stern (2000) states that many of such factors exist out of habit, with some intent driven behaviors which have not been habituated, causing zero impact. With pro-environmental behavior, as with behavior in most domains, there is a large discrepancy between attitudes and behaviors. One reason this occurs is that the attitudes measured are generally broad, while measured behaviors are more specific (Kolmuss & Agyeman 2002) (Marcinowski, 2002). The more specific the measured value, the stronger the behavioral influence will be (Marcinowski, 2002).

When considering motives to any action, one must also consider the barriers to those actions as they heavily influence the motivation process. Marcinowski (2010) and Kolmuss & Agyeman (2002) assert that habit is one of the strongest barriers to pro-environmental action. The strength of the habit affects the response to information pertaining to new habits; when the habit is strong, the attitude-behavior relation is weak (Marcinowski 2010). The social norm factor mentioned above may be an influence on early behavior change and habit (Marcinowski, 2010). Stern (2000) posits that economic

factors, time commitment and difficulty of action are other barriers to environmental action. These factors contribute to a lack of infrastructure which Kolmuss & Agyeman state are another barrier to pro-environmental action. They also found that if an individual does not feel that their actions have any influence, they do not act, with immediate motives (personal needs) often taking precedence over societal ones (Kolmuss & Agyeman). Stern (2000) asserts that education alone is not sufficient for changing behaviors. The more motivators used (education, incentivization, etc.) the more likely an individual will be to change behavior.

When considering motivations of pro sustainable development in childhood, we should first focus on child development in general. Piaget's model of moral development puts children ages 7-11 in the Authoritarian stage. At this developmental level, children follow the rules because they come from an authority figure (Piaget, 1969). Research has shown that one of the most prevalent reasons individuals become involved in environmental causes is the influence of an adult role model (Chawla, 2007), (Louv, 2005). These adult role models serve as the authoritarian models that the children look to for rules. When these role models model care for nature, children are likely to follow their cue. Kohlberg's Level of Moral Development labels the 7-10 year old age group as Pre-Conventional. Characteristics include concern with one's own needs, and actions as result of avoidance of punishment (Kohlberg, 1981). As following rules of authority figures often avoids punishment, this theory also fits the tendency for individuals involved in pro-environmental behavior to cite adult role models as a main reason for their initial actions. The development of locus of control also plays a role in a child's

development (Rotter, 1966). The locus of control relates to an individual's perception of their ability to affect a situation. Relationships with nature develop a sense of agency and competence in children. This agency leads children to develop the belief in achieving outcomes through environmental action (Chawla, 2007 & 2009). Hungerford & Volk Environmental Behavior Model (1990) consists of entry level variables, ownership variables and empowerment variables. These variables are hierarchical and develop in the child over time. The entry level variable of environmental sensitivity is developed in early childhood through frequent interaction with the natural environment and trusted adults who model environmental sensitivity (Hungerford & Volk, 1990). As children have usually acquired this sensitivity by age 12, it is pertinent to foster it in elementary school as it is a contributing factor to future pro-environmental behavior. (Hungerford & Volk, 1990). Higher level variables of personal investment in issues, knowledge and intention to act, advance from more developed locus of control. When developing environmental education, it is imperative that the developmental stages of the students are considered to maximize the learning potential. Engelson & Yockers (1990) have delineated major and minor emphasis content areas in alignment with child development. For children in grades 3-6, the major emphasis is on knowledge and environmental ethic, while the minor emphasis is on perceptual awareness, and citizen action experience (Engelson & Yockers, 1990). Students at this age are building on prior knowledge while developing environmental sensitivity. They are also beginning to grasp and practice action based connection with the natural world.

The direct environment of the individual also plays a role in creating pro-environmental attitudes and behaviors. Chawla (2009) observed that motivation to care for nature in children came from social learning. Children built environmentally related goals through societal and social cues. Our values regarding the environment are largely shaped by our culture (Kolmuss & Agyeman, 2002). Personal moral norms, which are partially shaped through our society and culture, are the main basis for pro-environmental action (Stern 2000)

Our emotional relationship to nature also plays a role in our behavior and the role of these feelings towards nature need to be included when analyzing behavior. It is imperative to a holistic view of environmental attitude and behavior change that we incorporate knowledge and feeling into consideration of attitudes and behaviors (Pooley & O'Connor, 2000). Perkins (2010) found that the concept of care is one of the most important influences on environmental action, and is a good indicator of willingness to make future sacrifices to protect the environment. Emotional affinity towards nature is a key factor in pro-environmental behavior (Stern, 2000). Chawla (2007) discovered that children attach to nature in the same way that they attach to parents and caregivers. Feeling safe to explore, they are able to create bonds with the natural world. Pro-sustainable behavior involves care for others as well as the physical environment, where pro-environmental behavior focuses on the environment. (Corral-Verdugo et al, 2014). Significant life experiences are an integral part of pro-environmental behavior. Chawla (2007) found that the most prevalent reason individuals become involved in environmental causes is attachment to childhood natural places

The second most prevalent reason individuals become involved in environmental causes is the presence of significant adults shaping their care for the natural world. Adult role models demonstrating care for the natural world is one of the most important ways to make children care for nature (Louv, 2005). Not only are these adults showing children the joy of the natural world, they are also shaping lifelong attitudes. Caregivers form the perceptions of the child through their own beliefs (Chawla, 2007).

Hands on learning regarding the natural world is imperative to the development of competence and pro-environmental beliefs, attitudes and behaviors. First hand learning in childhood shapes later relationships with nature (Chawla 2007) and these direct experiences have a stronger, longer lasting impact on behavior (Kolmuss & Agyeman, 2002). Duerden and Witt (2010) found that knowledge of the natural world gained through indirect experience transformed into action through direct experience, positively influencing attitudes and behaviors. Hands on learning offers children a more comprehensive learning environment as it combines the intellect with experience through immersion (Orr, 2012). Direct real world experience is the best learning environment (Stone, 2009) and these experiences in school and in the community instill agency in children (Smith, 2014). Environmental education experiences should fulfill the students' needs of: autonomy, competence and relatedness (Darner, 2012).

As children spend many of their waking hours in school, providing these experiences in the school environment is becoming more and more important. Students need to be involved in real world environmental problem solving activities in order to provide challenges that will boost competence (Darner, 2012). Much knowledge

transmitted in public schooling is abstract with no connection to experience (Orr, 2012), and many environmental programs focus mainly on cognition, giving little attention to other aspects (Pooley & O'Connor, 2000). An assessment of professional development in the 1990's determined that in environmental education, sustainability education specifically was an area of need (Marcinowski, 2010). The data from Kensler's study (2013) revealed that most school leaders found there was no formal learning needed for sustainability education. Kensler (2013) claims that with this information in mind, school leaders need professional development to access and utilize modeling sustainability and work it into the curriculum. While most environmental education programs have some focus on environmental literacy, few immerse students in environmental problem solving efforts (Marcinowski, 2010). Environmental/Sustainability education is most often taught in isolation and not throughout the curriculum. Deeper education is obtained through this cross-curricular relevance (Orr, 2012) and sustainability education should be embedded into all areas of learning (Armstrong, 2012). Gronhoj & Thogersen (2011) claim that recent findings regarding the significant impact of attitudes on environmental behavior support the need for environmental education to be integrated into the curriculum in order to develop stronger pro-environmental behaviors and attitudes. With our current environmental problems requiring immediate action, diligence is needed in the curriculum, with learning being taught through a holistic plan (Marcinowski, 2010).

To ensure that sustainability education is most effective, educators must consider how attitudes and behaviors are affected. As behavior change is a major stated goal of environmental education, we must first understand where attitudes come from in order to

affect behavior (Pooley & O'Connor, 2000). As individual behavior change is key to future development of sustainability, it is also key to the future of sustainability education (Frisk & Larson, 2011). Motivators of behavior change must be a cross-curricular constant in sustainability education. In fact, a failure to interweave behavioral science with educational philosophies to date has created a lack of transformative action. (Frisk and Larson, 2011). Programs that focus on habit change would positively influence behavior change and those that focus on specific pro-environmental behavior are more effective than those that teach about general environmental degradation. (Arbuthnott, 2012). Specific experiential education has been shown to strengthen students' confidence in their ability to make a positive environmental impact (Frisk & Larson, 2011).

Traditional education hopes that knowledge will transform to future action, while experiential learning provides the opportunity for the student to apply the knowledge (Frisk & Larson, 2011). If target behaviors which have significant environmental impact can be targeted early on, these programs can have the maximum effect (Stern, 2000). Examples of such programs are those in which children are able to directly relate the knowledge to their own lives. Growing school gardens, utilizing the products for school lunches and using the gardens as a supplement to all curricular areas offer students these connections (Stone, 2009). Children find direct relativity to sustainability education by creating a deep knowledge of their direct surroundings. Orr (2012) and Stone (2009) emphasize the importance of creating knowledge of place and integrating this idea into all areas of the curriculum. A key aspect of knowing place is community involvement. Stone (2009) cites community action as one of the main guiding principles of sustainability education. In place based learning, for example, students engage in the

community, solving real world problems with several stakeholders (Frisk & Larson, 2011). Through community service learning, students are involved in group collaboration with each other, teachers, community members and local government to work for a mutually beneficial goal (Frisk & Larson, 2011). Through these pedagogies and experiences, students get at the heart of sustainability, making wise choices that benefit us and the environment, while also considering the needs of future generations.

There have been promising studies done on why individuals engage in pro-environmental behavior, how children can use the natural world to strengthen these behaviors and what role formal environmental education plays in this process. There are many theories formed and studies done on how to motivate pro-environmental action, but they are not well integrated into educational practices. We have even less experience with studying how these processes relate to sustainability, and specifically, sustainability education. This knowledge is crucial for the future success of sustainability education.

Chapter 3: Methodology

Research Design

The objectives of this study are to discover the relationships between educational experience and sustainability attitudes and behaviors in elementary school students, and to determine the motivation behind pro-sustainability behaviors and the role this plays in educational programs. I have used mixed methodology through two modes of data collection: 1. Student surveys (Appendix 1), and 2. Teacher questionnaires (Appendix 2). The surveys are self-report and were analyzed quantitatively to determine patterns. This method was chosen as it is an efficient way to collect information about attitudes and beliefs. As the surveys were completed in school, this method ensured a higher rate of survey return. The questionnaires are qualitative and structured, with open ended responses. This method was chosen as it provided more substantive answers from the educators, while still offering the participants ease of completion.

Sampling/Consent

Sampling for the surveys was based on convenience sampling as those schools who agreed to participate in the research were selected. One school with sustainability based curriculum, Sustainability Academy at Barnes (SAB), and one with general curriculum, CP Smith Elementary School, participated in the survey. Sixty three students completed the survey from SAB, and 34 students from CP Smith completed the survey. This age group was chosen as it is this age that environmental education focus is on knowledge and environmental ethics. Schools were chosen that have similar

demographics to control for socio-economic status. Extensive prior contact with school administration was made to ensure success and to communicate the benefits of the project to the schools. The student surveys were given in class as part of routine daily work, and consent was obtained through the administration's participation. Surveys were kept anonymous, with school affiliation and grade level the only identifiers used.

Sampling for the questionnaires was determined by the participants teaching role in relation to the SAB students. Structured, open ended questionnaires were completed by the five teachers of the SAB students who completed the survey. The eighteen questionnaire questions are focused on what sustainability means to the teachers, how it is used in their curriculum, and perceived student sustainability attitudes/behavior. Consent was implied for the questionnaires through the subject's agreement to participate. Questionnaires and surveys will be kept anonymous with no identifiers.

Data Collection

Surveys were administered in hard copy paper form. Students were given an in class time allotment to anonymously complete surveys and return them to the teachers. The survey content was adapted from Children's Environmental Attitude and Knowledge Scale (Leeming et al, 1995), with some alteration to adhere to solely sustainability content. Reliability and validity measures for the original scale were consistently high (Leeming et al, 1995). The surveys measure both attitudes and behaviors, with each domain containing 10 representative survey items. All items are scaled on a 5 point Likert system. The structure of the surveys allows for in depth comparison of both inter

and intra-curricular responses. The operationalization of attitudes and beliefs into easily coded indicators allows for easy analysis of data content and relationships.

Questionnaires were administered digitally with a structured set of questions. Teachers were given 10 days to complete open ended answers and return them. Questionnaire items focused on: sustainability pedagogies, curriculum structure, and sentiment analysis regarding benefits of sustainability education and students' attitudes, behaviors, and motivations. The structure of the questionnaires allows for clarity in assessing pedagogies and attitudes of the teachers who may be influencing the students who participated in the surveys. These aspects may provide insight regarding the students' sustainability attitudes, behaviors, and especially, motivations.

Data Analysis

The Children's Environmental Attitudes and Knowledge Scale original tests for validity and reliability were high (Leeming et al 1995); however, as they were slightly adapted, the attitude and behavior indicators were retested for internal consistency with Cronbach's alpha. Frequencies were calculated for each of the 20 survey indicators for each school, analyzing means, frequency of answer for each level of the scale, and percentage of answers for each level. Results were then compared between schools to determine percentage differences of answers based on scale increments. Bivariate analysis was produced through correlating data from each indicator on the scale. Results were analyzed to determine significant Pearson's r correlations within the data.

Questionnaires were hand coded to determine significant similarities in responses. As the content of the questionnaires was largely based on opinion and attitude, sentiment analysis was deemed to be the most effective tool to analyze the content. The themes extracted from the responses were then compared to patterns of answers from the students of the teachers completing the questionnaires to determine commonalities between teacher attitudes and behaviors, and those of their students.

Limitations

One limitation of this research centers around the fact that both methods are self-reported thus relying only on information given by the participants. However, the surveys are anonymous, giving students more opportunity to answer honestly; and the questionnaires allow subjects time to reflect on the answers. Another limitation is that due to the size of the sample, the results will have limited external validity, and should not be generalized to the population.

Chapter 4: Results

Surveys

Internal consistency was using Cronbach's alpha (see table 1). Both sets of indicators had high reliability, but the score for the attitude indicators was slightly higher than that for the behavior indicators. For the attitude indicators, 6 samples were excluded and for the behavior indicators, 7 samples were excluded due to incomplete survey information.

Table 1- Reliability Data

		Attitudes		Behaviors	
		N	%	N	%
Cases	Valid	91	93.8	90	92.8
	Excluded ^a	6	6.2	7	7.2
	Total	97	100.0	97	100.0

Attitudes		Behaviors	
Cronbach's Alpha	N of Items	Cronbach's Alpha	N of Items
.861	10	.809	10

Attitude Indicators

Table 2- Mean Scores for Attitude Indicators by school

School		Fewer 4 animals	less water	ride bus	recycling	upset pollution	save energy	upset habitats	reuse/borrow	use what you need	think of new environmental ways
CP Smith	Mean	3.68	3.18	2.91	4.24	3.94	4	3.62	3.09	4	4.24
	N	34	34	34	33	33	33	34	34	34	33
Barnes	Mean	4.51	4.43	3.87	4.71	4.51	4.63	4.48	3.97	4.53	4.66
	N	63	63	63	63	61	63	63	63	62	62
Total	Mean	4.22	3.99	3.54	4.55	4.31	4.42	4.18	3.66	4.34	4.52
	N	97	97	97	96	94	96	97	97	96	95

“It is important to buy fewer things if it would save animals lives”

The mean for this indicator for the students from SAB was 4.5; with 75% of students answering at the highest level of 5 (strongly agree). The mean for this indicator for C.P Smith students was 3.7, with 32.4% of students answering at the highest level. There is a 20% difference in the mean between the two schools, and a 42.6% difference in number of students strongly agreeing with the question. (See Table 2, Graph 1)

“It is important to save water by using less when bathing”

The mean for this indicator for the students from SAB was 4.4; with 63% of students answering at the highest level. The mean for this indicator for C.P Smith students was 3.2, with 8% of students answering at the highest level. There is a 30% difference in the mean between the two schools, and a 55% difference in number of students strongly agreeing with the question. (See Table 2, Graph 1)

“It is important to ride the bus more instead of driving, to reduce pollution”

The mean for this indicator for the students from SAB was 3.9; with 41% of students answering at the highest level. The mean for this indicator for C.P Smith students was 2.9, with 20% of students answering at the highest level. There is a 25% difference in the mean between the two schools, and a 21% difference in number of students strongly agreeing with the question. (See Table 2, Graph 1)

“It is important to separate recycling from the garbage”

The mean for this indicator for the students from SAB was 4.7; with 86% of students answering at the highest level. The mean for this indicator for C.P Smith students was 4.2, with 62% of students answering at the highest level. There is a 13% difference in the mean between the two schools, and a 26% difference in number of students strongly agreeing with the question. (See Table 2, Graph 1)

“I get upset about the damage pollution does to the environment”

The mean for this indicator for the students from SAB was 4.5; with 70% of students answering at the highest level. The mean for this indicator for C.P Smith students was 3.9, with 47% of students answering at the highest level. There is a 15% difference in the mean between the two schools, and a 23% difference in number of students strongly agreeing with the question. (See Table 2, Graph 1)

“It is important to save energy”

The mean for this indicator for the students from SAB was 4.6; with 73% of students answering at the highest level. The mean for this indicator for C.P Smith students was 4.0, with 41% of students answering at the highest level. There is a 15% difference in the mean between the two schools, and a 32% difference in number of students strongly agreeing with the question. (See Table 2, Graph 1)

”I get upset when I see houses being built where animals used to live”

The mean for this indicator for the students from SAB was 4.5; with 70% of students answering at the highest level. The mean for this indicator for C.P Smith students was 3.6, with 38% of students answering at the highest level. There is a 23% difference in the mean between the two schools, and a 32% difference in number of students strongly agreeing with the question. (See Table 2, Graph 1)

“Is important to use old or borrowed things rather than buy new ones”

The mean for this indicator for the students from SAB was 4.0; with 52% of students answering at the highest level. The mean for this indicator for C.P Smith students was 3.1, with 21% of students answering at the highest level. There is a 23% difference in the mean between the two schools, and a 31% difference in number of students strongly agreeing with the question. (See Table 2, Graph 1)

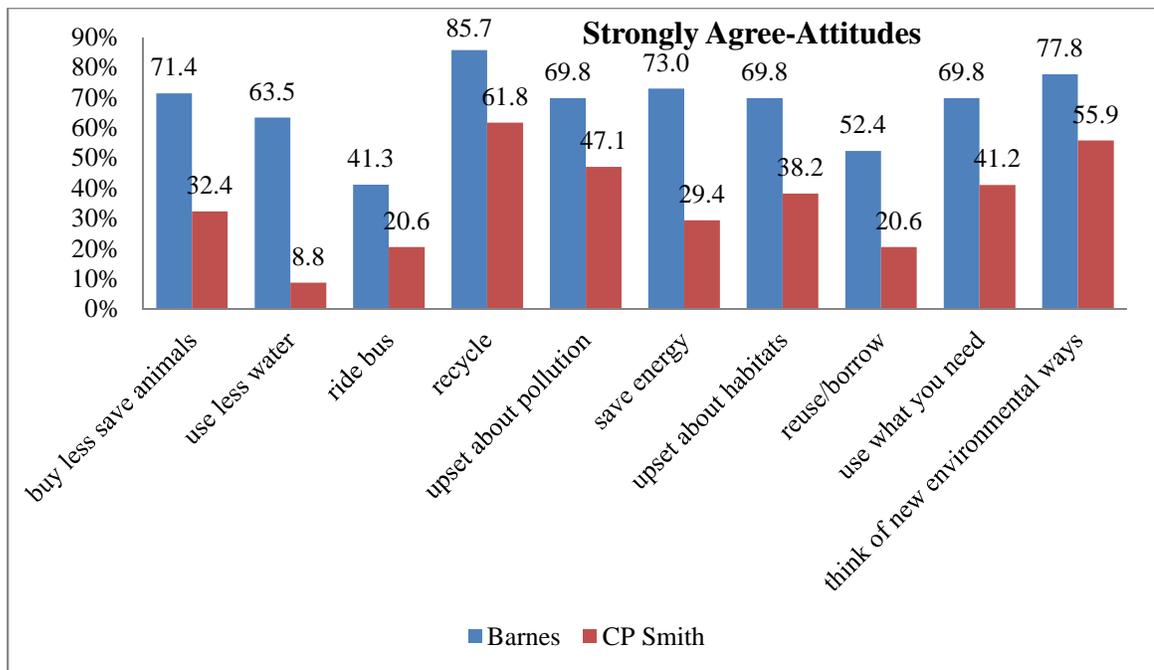
“It is important to only use what you need so that others will have some too”

The mean for this indicator for the students from SAB was 4.5; with 70% of students answering at the highest level. The mean for this indicator for C.P Smith

students was 4.0, with 41% of students answering at the highest level. There is a 13% difference in the mean between the two schools, and a 29% difference in number of students strongly agreeing with the question. (See Table 2, Graph 1)

“It is important to think of new ways to do things that are important for the environment”

The mean for this indicator for the students from SAB was 4.6; with 78% of students answering at the highest level. The mean for this indicator for C.P Smith students was 4.2, with 56% of students answering at the highest level. There is a 10% difference in the mean between the two schools, and a 22% difference in number of students strongly agreeing with the question. (See Table 2, Graph 1)



Graph 1- Percentage of students who strongly agree by school

Behavior Indicators

Table 3-Mean score of Behavior Indicators by School

School		turn of water (beh)	turn off lights (beh)	recycle (beh)	reuse (beh)	borrow (beh)	less consumption (beh)	learn new energy (beh)	use think others (beh)	bus/carpool (beh)	talk to others/save resources (beh)
CP Smith	Mean	4.06	4	3.06	3.39	2.76	3.24	2.91	3.33	2.97	3
	N	33	32	32	33	33	33	33	33	33	32
Barnes	Mean	4.46	4.16	3.75	4.32	3.5	3.81	3.68	4.02	3.49	3.75
	N	63	63	63	62	62	63	63	62	61	63
Total	Mean	4.32	4.11	3.52	4	3.24	3.61	3.42	3.78	3.31	3.49
	N	96	95	95	95	95	96	96	95	94	95

“I turn of the water when I brush my teeth”

The mean for this indicator for the students from SAB was 4.5; with 73% of students answering at the highest level. The mean for this indicator for C.P Smith students was 4.1, with 56% of students answering at the highest level. There is a 10% difference in the mean between the two schools, and a 17% difference in number of students strongly agreeing with the question. (See Table 3, Graph 2)

“I turn off lights at home when they are not being used”

The mean for this indicator for the students from SAB was 4.2; with 54% of students answering at the highest level. The mean for this indicator for C.P Smith students was 4.0, with 38% of students answering at the highest level. There is a 5% difference in the mean between the two schools, and a 16% difference in number of students strongly agreeing with the question. (See Table 3, Graph 2)

“I ask my family to recycle”

The mean for this indicator for the students from SAB was 3.7; with 51% of students answering at the highest level. The mean for this indicator for C.P Smith students was 3.1, with 24% of students answering at the highest level. There is a 15% difference in the mean between the two schools, and a 26% difference in number of students strongly agreeing with the question. (See Table 3, Graph 2)

“I reuse old things as long as I can”

The mean for this indicator for the students from SAB was 4.3; with 57% of students answering at the highest level. The mean for this indicator for C.P Smith students was 3.4, with 24% of students answering at the highest level. There is a 23% difference in the mean between the two schools, and a 33% difference in number of students strongly agreeing with the question. (See Table 3, Graph 2)

“I borrow things instead of buying new ones”

The mean for this indicator for the students from BSA was 3.5; with 33% of students answering at the highest level- strongly agree. The mean for this indicator for C.P Smith students was 2.8, with 12% of students answering at the highest level. There is an 18% difference in the mean between the two schools, and a 21% difference in number of students strongly agreeing with the question. (See Table 3, Graph 2)

“Sometimes I don’t buy things I want because I know I don’t need them”

The mean for this indicator for the students from SAB was 3.8; with 43% of students answering at the highest level. The mean for this indicator for C.P Smith students was 3.2, with 18% of students answering at the highest level. There is a 15% difference in the mean between the two schools, and a 25% difference in number of students strongly agreeing with the question. (See Table 3, Graph 2)

“I learn about ways to make clean energy”

The mean for this indicator for the students from SAB was 3.7; with 37% of students answering at the highest level. The mean for this indicator for C.P Smith students was 2.9, with 12% of students answering at the highest level. There is a 20% difference in the mean between the two schools, and a 25% difference in number of students strongly agreeing with the question. (See Table 3, Graph 2)

“I think about what others need when I use things”

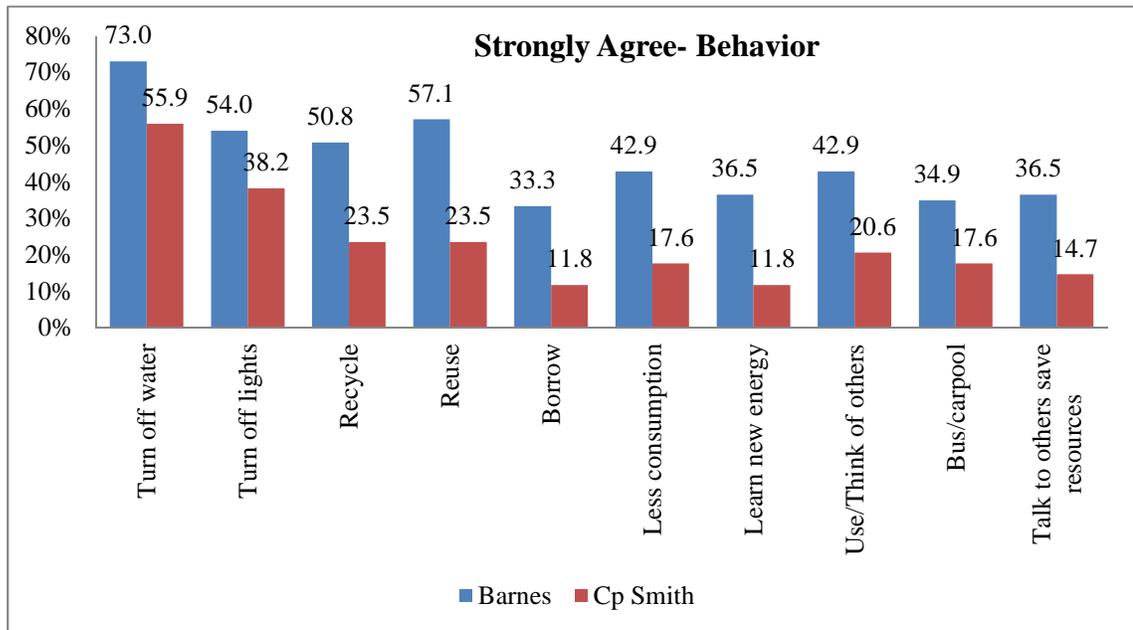
The mean for this indicator for the students from SAB was 4.0; with 43% of students answering at the highest level. The mean for this indicator for C.P Smith students was 3.3, with 21% of students answering at the highest level. There is an 18% difference in the mean between the two schools, and a 22% difference in number of students strongly agreeing with the question. (See Table 3, Graph 2)

“I ride the bus or carpool to help pollution”

The mean for this indicator for the students from SAB was 3.5; with 35% of students answering at the highest level. The mean for this indicator for C.P Smith students was 3.0, with 18% of students answering at the highest level. There is a 13% difference in the mean between the two schools, and a 17% difference in number of students strongly agreeing with the question. (See Table 3, Graph 2)

“I talk to my family and friends about ways to save resources (water, energy, trees, etc.)”

The mean for this indicator for the students from SAB was 3.7; with 37% of students answering at the highest level. The mean for this indicator for C.P Smith students was 3.0, with 15% of students answering at the highest level. There is an 18% difference in the mean between the two schools, and a 22% difference in number of students strongly agreeing with the question. (See Table 3, Graph 2)



Graph 2- Percentage of students who strongly agree by school

The three lowest indicators by mean for attitudes and behavior were the same for both the SAB students and the CP Smith students. The three lowest attitude indicators were: riding the bus, reusing/borrowing, and using less water. The three lowest behavior indicators were: borrowing, learning new ways to make energy, and riding the bus. The three highest indicators by mean for attitude and behavior were also the same for SAB and CP Smith students. The three highest attitude indicators were: recycling, thinking about new ways to do things that are better for the environment, and saving energy (CP Smith had “it is important to use only what you need” with the same mean score as saving energy). The three highest indicators for behavior were: turning off water, reusing, and turning off the lights.

The range of percent of survey takers answering at 5 (strongly agree) was between 34%-86% for SAB, and between 9-64% for CP Smith. The average percent of students answering a 5 on the attitude indicators was 30% higher (68/38) for SAB students than CP Smith students. The average percent of students answering 5 on the behavior indicators was 22% higher (47/25) for SAB students than CP Smith students. The attitude indicators that received the highest percentage of strongly agree answers were recycling and thinking of new ways to do things that are better for the environment, for both CP Smith and SAB. The behavior indicators that received the highest percentage of strongly agree answers were: turning off water, reusing (SAB) and turning off lights (CP Smith). The attitude indicators with the lowest number of strongly agree answers for SAB were: riding the bus, and reusing/borrowing; for CP Smith, using less water and

reusing/borrowing. The behavior indicators with the lowest number of strongly agree answers for SAB were: borrowing and riding the bus; for CP Smith, borrowing and learning about ways to make clean energy. The indicators that had the biggest gap in percentage answering strongly agree between the schools were using less water and buying fewer things to save animals (55%/39%) for attitude indicators. Behavior indicators with the biggest gap in percentage answering strongly agree were reusing and recycling (34%/26%).

Bivariate Analysis using Pearson's r was run to determine correlations between attitude and behavior scores for each school (See Tables 4 and 5). Correlations were separated into two groups: 1. Attitudes/Behaviors measuring the same or similar value, (ex. It is important to separate recycling and I ask my family to recycle), and 2. Attitudes/Behaviors measuring different values that had statistically significant correlation.

Barnes Attitude/Behavior Correlations										
	water	lights	(beh)	(beh)	(beh)	consump	energy	think	carpool	others
fewer 4 animals	.142	.119	.238	.150	.281*	.234	.412**	.464**	.346**	.405**
less water	.165	.272*	.251*	.515**	.210	.081	.021	.149	.318*	.231
ride bus	-.086	.015	.164	.143	.321*	.133	.132	.118	.379**	.390**
recycling	.254*	.207	.392**	.324*	.319*	.429**	.197	.394**	.409**	.272*
upset pollution	.303*	.177	.519**	.277	.420**	.442**	.284*	.533**	.426**	.335**
save energy	.012	.394**	.217	.191	.367**	.337**	.097	.230	.349**	.343**
upset habitats	.139	.226	.313*	.533**	.324*	.098	-.056	.113	.258*	.220
reuse/borrow	.266*	.353**	.510**	.480**	.524**	.315*	.226	.299*	.334**	.540**
use what you need	.234	.178	.353**	.174	.472**	.267*	.283*	.412**	.373**	.217
think of new env ways	-.017	.258*	.401**	.252	.468**	.309*	.261*	.166	.299*	.157

Table 4

*. Correlation is significant at the 0.05 level (2-tailed).

** . Correlation is significant at the 0.01 level (2-tailed).

Yellow cells= specific attitude/behavior correlations

Green cells= other statistically significant attitude/behavior correlations

CP Smith Attitude/Behavior Correlations										
	turn off water (beh)	turn off lights (beh)	recycle (beh)	reuse (beh)	borrow (beh)	less consumption (beh)	learn new energy (beh)	use think others (beh)	bus/carpool (beh)	talk to others save resource (beh)
fewer 4 animals	-.119	-.254	-.040	.097	-.038	.097	.039	.179	.065	-.136
less water	-.031	.033	.088	.443**	-.001	.053	.117	.148	.168	.125
ride bus	.438*	.326	.036	.484**	.295	.504**	.152	.480**	.061	-.208
recycling	.416*	.183	.079	.562**	.020	.432*	.173	.234	.163	.052
upset pollution	.394*	.046	.154	.225	.240	.240	.114	.248	-.016	-.169
save energy	.404*	.557**	.358*	.441*	.308	.184	.268	.249	.059	.195
upset habitats	.366*	.368*	.162	.350*	.178	.080	.089	.177	.076	-.232
reuse/borrow	.205	.297	.211	.275	.500**	-.024	.102	.170	-.248	-.246
use what you need	.369*	-.029	.062	.009	.017	.207	-.094	.368*	.081	-.153
think of new env ways	.224	.339	.278	.333	.187	-.024	.339	.234	-.039	-.076

Table 5

*. Correlation is significant at the 0.05 level (2-tailed).

** . Correlation is significant at the 0.01 level (2-tailed).

Yellow cells= specific attitude/behavior correlations

Green cells= other statistically significant attitude/behavior correlations

There are 17 specific attitude/behavior correlations. These are correlations where the two indicators are focused on the same value (recycling, saving water, etc.) Of these 17, the SAB students' scores were statistically significant on 12. This means that each individual survey taker's score on one indicator was highly correlated to his/her score on the other indicator in the attitude/behavior pair. Of the CP Smith students, only 3 of 17 specific behavior/attitude correlations were shown to be significant. All 3 of these indicators were also statistically significant with the SAB students. These 3 correlations are between: 1. It is important to use old or borrowed things/I reuse old things as long as I can, 2. It is important to save energy/I turn off lights when not in use, and 3. It is important to use only what you need so others will have some too/I think about what others need when I use things.

SAB students produced 47 statistically significant correlations between indicators that were not measuring the same value (e.g. recycling/using the bus). The highest of these correlations for SAB students are correlations between: 1. Upset about pollution/Thinking of others when using things ($r = .533$), 2. Upset about habitat destruction/Reuse ($r = .533$), 3. Upset about pollution/Recycling ($r = .519$), 4. Important to use less water/ Reuse ($r = .515$), and 5. Important to reuse or borrow/ Recycle ($r = .510$).

CP Smith Students produced 16 statistically significant correlations between indicators that were not measuring the same value (e.g. recycling/using the bus). The highest of these correlations for CP Smith are between: 1. Important to recycle/Reuse ($r = .562$), 2. Important to ride bus/ Don't need don't buy ($r = .504$), 3. Important to ride

bus/ Think of others when use things ($r = .480$), 4. Important to save water/ Reuse ($r = .443$), and 5. Important to save energy/Reuse ($r = .441$).

SAB and CP Smith produced statistically significant values for seven correlations between indicators that were not measuring the same value (ex. recycling/using the bus).

These were found between:

1. Important to recycle/ I turn off water
2. I get upset about pollution/I turn off water
3. Important to use less water/ I reuse things
4. Important to recycle/ I reuse things
5. I get upset about habitat loss/ I reuse things
6. Important to reuse or borrow/ I borrow things
7. It is important to recycle/ Don't need-Don't buy

Six of the seven statistically significant values between indicators that were not measuring the same value which were produced between SAB and CP Smith, were related to recycling, reusing or borrowing. In the top ten attitude/behavior correlations for SAB overall (both value specific and other), eight of the correlations are in the categories of reusing, recycling or borrowing. In the top ten attitude/behavior correlations for CP Smith overall (both value specific and other), six of the correlations are in the categories of reusing, recycling or borrowing.

Questionnaires

When asked about what sustainability meant to the five respondents of the questionnaire, the most common response was to improve the quality of life not only environmentally, but also socially and economically. A sense of shared responsibility was also mentioned as well as: connection to nature, sense of place, and social justice. In response to the inquiry about the most important aspects of sustainability, most cited developing self-agency to create future change, with the related ideal of social justice also being mentioned. When questioned as to why they felt these aspects were important, the participants answered that creating self -agency for future change promotes and sustains long term change that benefits all and social justice comprehensively addresses the gamut of struggles. *“I think social justice is a very important aspect of sustainability. I think this is because social justice incorporates all of the struggles our students face each day, such as: socio-economic struggles and diversity and equity struggles. If people have a clean environment, decent food and shelter, a chance for higher education and a level playing field in all areas of diversity and equity THAT is social justice”~ Barnes educator.*

Regarding curriculum, all respondents felt that sustainability was integrated into all areas of the curriculum; with most stating that social justice was an important curricular focus. Other noted curricular foci were: community, systems, environmental preservation, and problem solving. When asked what areas of sustainability were less of a focus, the only response was affordable housing. Specific pedagogies utilized by the teachers are placed based education and service learning. As far as the perceived benefits of sustainability education, most respondents mentioned awareness of sustainability

issues, with other aspects being: change making, global warming preparation, justice issues and empathy. *“Sustainability education prepares our students for the formidable challenges of the 21st century, such as reversing global warming, improving the world so we have a clean and safe environment, facing justice issues in the U.S. and in third world countries, and cooperating with other countries in order to abolish war. These are very real challenges and our students have to be prepared to deal with them. In addition, we have to help them develop a sensitivity to others so they can learn to work together for peace and justice”~ Barnes educator.*

In the area of hands-on learning, the participants were questioned about time spent in the natural world and community engagement. Time spent involved with the community garden and various field trips into the natural world were referenced by most with natural outdoor playscapes also being mentioned as experience in the natural world. A majority of the respondents noted community speakers and partnerships with local organizations as important community aspects. *“We have a large school garden to help students enjoy the experience of digging in the ground and growing their own plants.”* *“The community is a big part of our curriculum. We bring in outside speakers who live and work in the community, we try to partner with local organizations”~ Barnes educators.*

When asked how the teachers saw the students’ attitudes towards sustainability change, all respondents mentioned the area of social justice. *“They have become much more aware of the need to preserve the environment...and they are aware of the needs of the poor . Their studies have included immigration and the challenges that immigrants*

faced.” *“Our students have made growth this year in understanding social justice issues surrounding economics, fairness, and equity”~ Barnes educators.* A project involving producer/consumer economics and sustainability was credited for this change. Attitude changes toward preservation of the natural world were also noted. Regarding areas of perceived behavior change, respondents mentioned heightened care for the school community, as well as involvement in the local food movement, and behaviors connected to justice issues. *“Students are much more aware of costs, access to local foods, food miles, etc. and are taking this home. They are also much more aware of and willing to help take care of their school community”~ Barnes educator.* The respondents were also asked to consider the relationship between sustainability attitudes and behaviors. The idea that knowledge affects attitudes which then encourages behavior, was held by most respondents. The notion that awareness leads to empathy (closely related to knowledge leading to attitudes) was also mentioned.

The final area of inquiry was motivation and barriers to sustainable behavior. The feeling that the development of a sense of agency motivates students to engage in pro-sustainable behavior was shared by a majority of respondents. The importance of opportunities available for students to practice pro-sustainable behavior was also highly noted. *“Continued knowledge of how they can make a difference and access to opportunities (motivate students)” ~ Barnes educator.* The presence of adult role models, exposure to nature, service learning, and place based education also were listed. The most noted barriers to pro-sustainable behaviors were: socio-economic limitations and family/cultural priorities. *“I think that we need to remember that our students are in fact*

behavior; rather attitudes influence intention which helps shape actions (Kolmuss & Agyeman, 2002). These results also support the original hypothesis that students from both schools would score higher on attitude indicators than on behavior indicators.

Concerning specific sustainability ideas, the highest and lowest indicators for attitude and behavior were the same for both schools, supporting the original hypothesis that there will be distinct areas which are being well covered in both sustainability focused and traditional schools and also distinct areas which will need more attention. Attitudes and behaviors regarding riding the bus and borrowing were the lowest among all students. This may imply that sustainable transportation and the idea of borrowing, rather than buying what is needed, are areas that are not being well covered in sustainability or non-sustainability schools. The highest attitude indicators (recycling, thinking about new ways to do things that are better for the environment, and the importance of saving energy) had less of a connection with the highest behavior indicators. Saving energy and turning off the lights are a direct relation; however, they seem to be the only high scored attitude/behavior relation. Another high behavior indicator was turning off the water, while the attitude for saving water ranked about average. The behavior of reusing also scored high, while the attitude of reusing/borrowing scored low. These results imply that not only can attitudes score higher than behaviors, but behaviors can also score higher than attitudes. These results can be interpreted as unevenness in curriculum focus and linearity. If the curriculum is geared toward developing a certain behavior before it has sufficiently developed the corresponding attitude, the attitude towards the behavior may have more relevance to the

student than the attitude itself. Another interpretation is that the presence of the behavior is due to a factor outside of the sustainability education program such as culture. In fact, personal moral norms, which are partially shaped through our society and culture, are a main basis for pro-environmental action (Stern, 2000)

There were also areas of notice where the scores created a much larger than average gap between the two schools. For attitude indicators, using less water and buying fewer things to save animals had the largest gaps for students scoring a 5. Students at SAB answered 5 on using less water 55% percent more than students at CP Smith, and 39% more on buying fewer things to save animals. For behavior indicators, the largest gaps were seen for reusing and recycling. Students at SAB answered 5 on reusing 34% more and on recycling, 26% more. These results suggest that SAB students are receiving substantially more education/instruction in these areas than are CP Smith students.

The bivariate analysis data shows that SAB students had considerably more statistically significant correlations both for value specific and unrelated attitudes and behaviors. This suggests that the more developed sustainability attitudes of these students is leading to a wider area of behavior change regarding sustainability. CP Smith's data suggests that the slower development of committed sustainability attitudes is also affecting the extension of these attitudes into the behavior realm, both for value specific and unrelated domains. These results are consistent with the assertion found in the questionnaires that a benefit of sustainability education is developing awareness of sustainability issues. The data associates not only a more developed awareness of sustainability issues in the SAB students, but also an ability to generalize these values

across the scope of sustainability. The presence of a sustainability integrated curriculum at SAB may contribute to these findings.

My original hypothesis of sustainability focused programming utilizing integrated curriculum was also confirmed by the SAB teachers in their questionnaires, with all respondents categorizing their curriculum as sustainability integrated. The presence of this integration assists students in making connections that may not otherwise be made, such as the impact of sustainability attitudes on seemingly unrelated behaviors. This is consistent with the assertions that a deeper education is obtained through this cross-curricular relevance and should be imbedded into all areas of learning (Orr, 2012) (Armstrong, 2012). It also echoes the findings of Gronhog & Thogersen (2011) that environmental education needs to be integrated into the curriculum in order to develop stronger pro-environmental behaviors and attitudes.

The data revealing the statistical significance of the reuse/borrow/recycle predictors suggest that these attitudes and behaviors have an impact on many other sustainability attitudes and behaviors for both schools. Saving water, saving energy, and emotional response to pollution and habitat destruction are a few areas where reuse/borrow/recycle showed high correlation. Interestingly, the reuse/borrow attitude scores were high for both schools, as was the reuse behavior. However, buying less was lower and borrowing behavior ranked quite low. This is indicative of much more attention being given to recycling and reusing than borrowing and consuming less. Our culture is one of consumption. It is also one that individualizes our responsibility; therefore borrowing from others is not an inherent part of our daily lives. The fact that

this would influence the attitudes and behaviors of the students is consistent with Stern's (2000) findings that a major factor in pro-environmental action is the norms that are shaped through our society and culture. It is logical that this would also apply to pro-sustainability behaviors. This cultural norm motivation also produces sustainability-minded benefits. As recycling and reusing form the foundation of many of the correlations with other attitudes and behaviors, the students are obviously connecting their benefits to other areas of sustainability, thus this cultural influence is serving as a pro-sustainability motivator. The SAB educators revealed that they have observed more developed attitudes in the area of preserving nature. One can easily surmise that students are applying the effects of recycling and reusing through a systems approach to the impact it has on nature as a whole.

Thinking of new ways to do things that are better for the environment and recycling produced the highest mean attitude scores for both schools, and turning off the water/lights produced the highest mean behavior scores for both schools. These three indicators all measure high opportunity pro-sustainability experiences for students. They are activities students can engage in several times a day both at home and at school. As the students are offered multiple opportunities to engage in these behaviors, they most likely strengthen students' feelings of self-agency. This is in line with the assertion that a child's relationship with the natural world strengthens his/her belief that they can produce beneficial outcomes through environmental action (Chawla, 2007 & 2009). The SAB educators concluded that one of the most important aspects of sustainability was that the opportunity to create self-agency for future change promotes and sustains long term

change that benefits all. The most noted areas for developing this self- agency were: place based education, service learning, and garden related activities. These attitudes are consistent with the findings of Stone (2009) and Smith (2014) that the best learning environment is direct real world experience and that these experiences instill self-agency in children both in school and the community. One of the best experiences for children to directly relate their knowledge to their own lives is in the garden (Stone, 2009) Through the process of growing, preparing, and consuming, the students are involved in a cross-curricular real world experience, further instilling motivation for pro-sustainability action.

Another stated hypothesis of this study was that sustainability focused programs would have adults serving as sustainability minded role models. The data from the questionnaires reveal that the educators at SAB have a deep rooted and comprehensive understating of the importance of sustainability for the students, community and world as a whole. All of the respondents highlighted the importance of the three legs of sustainability: environmental, social, and economic, as well as the importance and implementation of a cross-curricular sustainability program. The educators' emphasis on service learning and social justice as well as consideration of motivation of pro-sustainability attitudes and behaviors exhibit the presence of solid role models in the area of sustainability. These findings are in line with the conclusion that one of the most dominant motivators for one to become involved in environmental causes is an adult role model (Chawla, 2007; Louv, 2005). As environmental causes are inherently embedded in

sustainability minded programming, it is logical to assume that the importance of an adult role model is also pertinent in sustainability.

Another focus of sustainability that the SAB educators highlighted was community involvement. They noted that care for the community was an area where they saw students' behavior changing. The educators also listed service learning in the community and community partnerships as activities built into their curriculum. This is an area where we see some difference from research on environmental education. Although community is a focus of environmental education, it is not an integral part of it. As sustainability encompasses environmental, economic and social realms, the involvement of the community becomes much more intertwined in sustainability education programming. Community action is, in fact, one of the main guiding principles of sustainability education.

The area of social justice is a motivational factor I had not considered previous to this research. This was the most mentioned concept in the teacher questionnaires, showing up in response to curriculum, attitude and behavior change, and important aspects of sustainability. As social justice and environmental justice are inextricable, it is not surprising that the educators consider it such an integral part of sustainability education. Curriculum has to constantly be cognizant of both the environment and quality of life and must incorporate the natural, technical, social economical, political and cultural (Ramsey et al, 1992). All of the educators drew on the schools motto of improving the quality of life not only environmentally, but also socially and economically. Social justice issues were highlighted much more than the economic or

environmental realms of sustainability. Many sustainability initiatives fall heavy on the environmental side. In the questionnaires, the natural world was mentioned a handful of times; while justice issues were mentioned 15 times. One possible reason for this is the urban environment of SAB. In cities (even small ones) the density of people puts social issues at the forefront of daily life. These students are surrounded by people and their struggles, not trees. Sustainability education may focus on the realm of sustainability that is most pertinent in their students' lives as it likely offers the most opportunity for direct involvement in sustainability issues. Empathy also plays a major role in awareness of and advocacy for social justice. This is consistent with Perkins's (2010) findings that the concept of care is an excellent indicator of environmental action and willingness to make sacrifices for the future.

As motivators for pro-sustainability attitudes and behaviors have been explored, so must be barriers to such attitudes and behaviors. According to the SAB educators, socio-economic limitations and family/cultural priorities are the biggest barriers the students face. This may not be generalizable but rather specific to the population focused on in this study. Culture, however, has been shown to influence environmental attitudes behaviors; therefore, it is logical that it would also play a role in sustainability attitudes and behaviors. As Chawla (2009) found, motivation to care for nature developed in childhood comes from social learning, and the family unit is a strong cultural influence in childhood.

Conclusion

The objectives of this study were to discover the relationships between educational experience and attitudes and behaviors in elementary school students, and to determine the motivation behind pro-sustainability behaviors and their role in educational programs. The data provided several findings related to these objectives. Students involved in sustainability programs scored higher on all behavior and attitude indicators and produced more significant correlations between attitudes and behaviors. These results suggest that their attitudes and behaviors are more developed than their peers, likely due to the sustainability focus at their school. The findings also reveal that both groups of students had the same high score and low score indicators, which suggests consistent areas of strengths and need in the curriculum, regardless of presence of sustainability programming. Another significant finding is the pertinence of reuse and recycle attitudes and behaviors as positive correlation to other sustainability attitudes and behaviors. This demonstrates that development of attitudes and behaviors in this domain may be positively affecting other sustainability initiatives.

The data from the teacher questionnaires present information on motivators for students' pro-sustainability attitudes and behaviors. Development of self-agency through curricular aspects such as service learning and place based education seem to contribute to motivation for pro-sustainability attitudes and behavior. The focus on social justice in the curriculum may also be acting as a motivator for students, as it makes more concrete relevant connections between the students, community, and world. In urban environments, the social leg of sustainability is generally much more present in the daily

lives of students than the environmental or even the economic. Utilizing the opportunities in the social realm to strengthen sustainability attitudes and behaviors in urban students may be the most direct way to creating sustainable connections. The role that empathy plays in social justice also may act as a motivator to get students involved in sustainable activities in all three realms of sustainability. The teacher responses also reinforced the importance of positive role models (the teachers themselves) as knowledgeable guides to further motivate students down a sustainable path. The educators have shown through their responses their understanding of the importance of developing attitudes before tackling behaviors, and the importance of a curriculum integrated with sustainability initiatives.

Based on this data, it is my recommendation that future sustainability curriculum should pay close mind to the areas of sustainable transportation and non-consumptive behaviors, as these areas scored the lowest among all students regardless of participation in sustainability programs. It would also be beneficial for sustainability curriculum to incorporate a social justice component that is integrated throughout the curriculum to tend to all three legs of sustainability: environment, economy, and society. Finally, attention to development of sustainability attitudes and then behaviors adheres to the natural progression of motivation in children.

Future study in this area should focus on a larger sample of students so that the results may be more generalizable to the population as a whole. Studies which analyze the curriculum itself would offer a more comprehensive understanding of the logistics of specific attitude and behavior development among students. Finally, longitudinal studies

would provide a more detailed account of motivation and attitude and behavior development and would help to delineate the developmental progression in childhood.

The results from this research display some positive insights on the benefits of sustainability education. The data offer awareness regarding areas of strength and needs in sustainability education and on what contributes to motivating students in developing pro-sustainable attitudes and behaviors. This study also reveals some aspects that are more prevalent in sustainability education (when compared to environmental education) due to its inclusion of economic and social domains. These findings will hopefully assist in developing more fine-tuned, efficacious sustainability education programs in the future.

Appendices

Appendix 1- Student Surveys

Attitudes	Disagree	Agree	Strongly Agree
It is important to buy fewer things if it would save animals lives.	1	2 3	4 5
It is important to use less water when bathing to save water.	1	2 3	4 5
It is important to ride the bus more instead of driving to reduce pollution	1	2 3	4 5
It is important to separate recycling from the garbage.	1	2 3	4 5
I get upset about the damage pollution does to the environment.	1	2 3	4 5
It is important to save energy.	1	2 3	4 5
I get upset when I see houses being built where animals used to live.	1	2 3	4 5
It is important to use old or borrowed things rather than buy new ones.	1	2 3	4 5
It is important to only use what you need so others will have some too.	1	2 3	4 5
It is important to think of new ways to do things that are better for the environment.	1	2 3	4 5
Behaviors	Never	Sometimes	Always
I turn off the water when I brush my teeth.	1	2 3	4 5
I turn off lights at home when they are not being used.	1	2 3	4 5
I ask my family to recycle.	1	2 3	4 5
I reuse old things as long as I can.	1	2 3	4 5
I borrow things instead of buying new ones.	1	2 3	4 5
Sometimes I don't buy things I want because I know I don't need them.	1	2 3	4 5
I learn about ways to make clean energy.	1	2 3	4 5
I think about what others need when I use things.	1	2 3	4 5
I ride the bus or carpool to help reduce pollution	1	2 3	4 5
I talk to my friends and family about ways to save resources (water, energy, trees etc.)	1	2 3	4 5

Appendix 2- Teacher Questionnaires

1. What does sustainability mean to you?
2. In what ways do you feel sustainability is integrated into the curriculum?
3. In what ways do students have direct experience with the natural world?
4. Is the community integrated into the curriculum?
5. If so, how?
6. What (if any) Sustainability pedagogies does your program draw on (Place Based Education, Smart by Nature, etc.)?
7. What do you feel are the most important aspects of sustainability education?
8. Why?
9. What benefits do think sustainability education has for students?
10. What areas of sustainability (if any) do you feel the curriculum focuses more on?
11. What areas of sustainability (if any) do you feel the curriculum focuses less on?
12. What areas of sustainability (if any) do you see the students' attitudes changing?
13. In what ways?
14. What areas of sustainability (if any) do you see the students' behavior changing?
15. In what ways?
16. In your opinion, what is the relationship between the students' attitudes and behaviors?
17. In your experience, what do you think motivates students to engage in sustainable behaviors?
18. What do you think are common barriers to sustainable behaviors in your students?

Bibliography

Arbuthnott, K. (2009), Education for sustainable development beyond attitude change. *International Journal of Sustainability in Higher Education* (10)2: 152 – 163.

Armstrong, J. (2012) Okanagan Education for Sustainable Living: As Natural as Learning to Walk or Talk In Barlow, Z., and Stone, M. *Ecological Literacy: Educating Our Children for a Sustainable World*. (pp. 80-84) San Francisco: Sierra Club Books.

Chawla, L. (2007). Childhood Experiences Associated with Care for the Natural World: A Theoretical Framework for Empirical Results. *Children, Youth and Environments* 17(4): 144-170.

Chawla, L. (2009) Growing Up Green: Becoming an Agent of Care for the Natural World. *The Journal of Developmental Processes*, 4(1): 6-23.

Corral-Verdugo et al (2014) On the Relationship Between Character Strengths and Sustainable Behavior. *Environment and Behavior*, Retrieved from eab.sagepub.com, January 11, 2015.

Duerden, M., Witt, P (2010) The Impact of Direct and Indirect Experiences on the Development of Environmental Knowledge, Attitudes, and Behavior. *Journal of Environmental Psychology* 30: 379-392

Engelson, D. & Yockers, D (1994) A Guide to Curriculum Planning in Environmental Education. Wisconsin Department of Public Instruction

Grønhøj, A., Thøgersen, J (2012). Action speaks louder than words: The effect of personal attitudes and family norms on adolescents' pro-environmental behaviour. *Journal of Economic Psychology* 33: 292–302

Hungerford, H & Volk, T (1990) Changing Learner Behavior Through Environmental Education. *The Journal of Environmental Education* 21(3)

- Kensler, L (2013). School leaders, sustainability, and green school practices: An elicitation study using the Theory of Planned Behavior. *Journal of Sustainability Education*, Volume 4
- Kohlberg, L. The Philosophy of Moral Development: Moral Stages and the Idea of Justice. San Francisco: Harper & Row, 1981
- Kolmuss, A & Agyeman, J. (2002). Mind the Gap: why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, 8(3), 239-260
- Louv, R. Last Child in the Woods. Chapel Hill, NC: Algonquin Press, 2005
- Marcinowski, T. (2010). Contemporary Challenges and Opportunities in Environmental Education: Where Are We Headed and What Deserves Our Attention? *The Journal of Environmental Education* 41(1): 34-54.
- Orr, D. (2012). Place and Pedagogy. In Barlow, Z., and Stone, M. Ecological Literacy: Educating Our Children for a Sustainable World. (pp. 85-94) San Francisco: Sierra Club Books
- Perkins, H. (2010). Measuring love and care for nature. *Journal of Environmental Psychology*, 30: 455-463
- Piaget, J. The Moral Development of the Child. New York: Free Press, 1969.
- Pooley & O'Connor(2000). Environmental Education and Attitudes: Emotions and Beliefs are What is Needed. *Environment and Behavior*, 32 (5): 711-723.
- Ramsey et al (1992). Environmental Education in the K-12 Curriculum: Finding a Niche. *Journal of Environmental Education*, 23 (2): 35-45.

Rotter, J.B (1966) Generalized Expectancies for Internal Versus External Control of Reinforcement. *Psychological Monographs* 80(1).

Smith, G. (2014) Education for Sustainability Essentials. *Journal of Sustainability Education* Volume 6.

Sobel, D. Placed Based Education: Connecting Classrooms and Communities. Great Barrington, MA: Orion, 2004.

Stern, P. C. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, 56(3), 407-424

Stone, M. Smart by Nature. Berkeley, CA: University of California Press, 2009