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“Growing Up Green: A Study Focusing on Environmental Attitudes, Knowledge and Focusing on Environmental Attitudes, Knowledge and Behaviors of Elementary Children.”

Sarah Elizabeth Smith
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To the Graduate Council:

I am submitting herewith a thesis written by Sarah Elizabeth Smith entitled ""Growing Up Green: A Study Focusing on Environmental Attitudes, Knowledge and Focusing on Environmental Attitudes, Knowledge and Behaviors of Elementary Children."" I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Agriculture and Extension Education.

Randol G Waters, Major Professor

We have read this thesis and recommend its acceptance:

Carrie Ann Stephens, Susan Lynne Hamilton

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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**“Growing Up Green:
A Study Focusing on Environmental Attitudes, Knowledge and
Behaviors of Elementary Children.”**

**A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee, Knoxville**

**Sarah Elizabeth Smith
August 2009**

ABSTRACT

“Growing Up Green,” is a research based environmental education program that teaches children about recycling, energy conservation, and composting. This program was taught to fourth grade students at H.B. Williams Elementary School, in White House, Tennessee. The children were given a pre-test before the program and a post-test two weeks after the program. The pre and post-test was composed of three parts. The three parts tested their environmental attitudes, knowledge, and behaviors. The study found that most of the children already had positive attitudes toward the environment. While, their attitudes decreased minimally after the program, they still remained very positive. The children did well on the knowledge test. Their environmental knowledge increased after the “Growing Up Green,” program. While the program did not appear to have a substantive impact on their environmental behavior adoption, the children already participated in some behaviors like recycling and conserving energy before the program, and continued these behaviors after the program, too.

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CHAPTER 1

INTRODUCTION

On the rise in America is the Green Movement. The daily discussion in the media and the government is ways to live green and become environmentally conscious. The United States is reaching a point where we are depleting our non-renewable resources and creating too much waste. The Green Movement identifies ways to help reduce these problems. Living Green is about saving energy, using renewable resources, and limiting wastes that you make in your everyday life.

The Green Movement and the abundance of information that is reported everyday is useful to people. It is making recycling and caring about the Earth popular. In Elizabeth Rogers and Thomas M. Kostigen's book, *The green book*, celebrities are making statements and appearances endorsing a green lifestyle (2007). Also, the entertainment industry is producing television shows on how to live a greener life. Even communities that were destroyed from natural disasters are being rebuilt in an eco-friendly way (Rogers & Kostigen, 2007).

One way people can help is changing their habits. There are many small changes that can make a big impact. For example, changes can be made in the amount of energy used, choosing organics over in-organics, recycling, and composting. By changing a few old habits or recycling more products can help minimize the pollution and waste created. Rogers and Kostigen have in their book simple steps you can take by making changes in your home, when traveling, at school, at work, or when shopping (2007). They also list tips about buying beauty products, sports equipment, and other necessities (Rogers & Kostigen, 2007).

What is important about the green movement and its methods available is that it pertains to everyone. Even children can help with this. Vanessa St. Gerard wrote an article about schools going green. She stated, “The green phenomenon is spreading, especially among schools, which have found that not only are they being environmentally friendly, they also are saving money to the tune of tens of thousands of dollars in some cases” (St. Gerard, 2008). Environmentally friendly and green schools incorporate the philosophy of living green into the children they teach. Starting children out at an early age thinking about being eco-friendly and living green might change how they live their lives. If children learn to recycle at an early age, they might start to recycle everything they can throughout their life. This behavior will become a habit.

Environmental education is becoming more important. Schools are focusing on becoming more environmentally friendly, and educators are encouraging children to spend more time outside. Samantha Cleaver stated, “Across the country environmental education schools and the growing movement to get children outdoors are challenging the current ‘indoor generation’ of kids” (2007). There is now a “No Child Left Inside Act,” which supports outdoor education at school and non-formal education centers (Lowell, 2008). Some other environmental education programs focusing on teaching children are the “Vision for Environmental Education” and the “Open Spaces” program. These are all focused on environmental and outdoor education for children (Lowell, 2008).

NEED FOR STUDY

Currently there are many environmental education programs for children. However, this program is focused on ways to live green. This study was conducted to assess children’s

attitudes, knowledge, and behaviors about the environment and when a child is taught a green program if their attitudes, knowledge, and behaviors become more pro-environmental.

The program focused on three key areas of living green: recycling, composting, and energy conservation. Within these three areas there are a wide array of ways to become eco-conscious and be involved in the green movement. Recycling, composting, and energy conservation are areas children can participate in. Leigh O'Brien stated, "Even the youngest children can learn to rinse out jars and bottles, and to put those old newspapers in the recycling bin" (2007). Recycling, composting, and energy conservation are all areas children can participate in.

Going green benefits everyone. Green schools have cited increased hands-on learning opportunities for students as another benefit of going green. Tom Welch, green school coordinator for Williamstown Elementary, has helped to form a green student council and to develop such events as 'no trash Wednesdays' and 'green transportation day' (St. Gerard, 2008). Teaching children and getting them involved in activities helps them become aware of the impact they are making on the earth, which affects everyone.

This study focused on teaching children how to be environmentally conscious and good stewards of our resources. It is important to teach children to love our earth. Clare Lowell stated, "It's not too much of a stretch to say that, if children don't care about nature today, they won't care about conserving it tomorrow when they're adults" (2008). As technology advances, the hope is we all one day will be driving hybrid automobiles and using energy efficient appliances. The children we teach to become conscious of the waste they produce will be the ones striving tomorrow to help the earth and reduce pollution.

Also, the importance of teaching children helps spread the word of living green. If a child is interested, he or she will bring these ideas home with them. This in turn, might motivate their parents to change their lifestyle habits. David Newnham's article, "Green Fingers," is about green programs in schools. Newnham states "Educating children is the key to educating the community: 'You can never ignore the power of children to influence their parents'" (2005). Getting a child interested in living green is good for the community. Spreading the word about easy ways to help save energy and our resources can help a lot. Instead of throwing your can or plastic bottle away, choose to recycle it. This makes an impact on the waste that is produced by people daily.

PURPOSE OF STUDY

The purpose of the study was to assess the impact of a green education program for youth. The three objectives of the program were to:

- 1) Determine changes in environmental attitudes of children after they are taught a green education program;
- 2) Test children's knowledge about living green before a green education program, and determine if their knowledge increases after the program; and,
- 3) See what behaviors the children currently have before a green education program and if their behaviors change after they have been taught the program.

The children had their attitudes, knowledge, and behaviors about the environment tested before the program. Two weeks later, the children were retested to see if their attitudes, knowledge, and behaviors changed. The evaluation was conducted to determine if the objectives of the program were met.

CHAPTER 2

LITERATURE REVIEW

Currently there is an abundance of literature concerning environmental education programs for children. The research based program, “Growing Up Green,” focuses mainly on green environmental education. The majority of the literature used for this program is about schools that already have green programs, and what practices they implemented in their schools.

GREEN PROGRAMS IN SCHOOLS

Vanessa St. Gerard wrote an article, “Savvy Schools Are Going Green,” (2008). This article is about schools that implemented green methods and are teaching these methods to the children at their school through hands-on learning activities. Certain days are dedicated to going green. These days are called, “No trash Wednesdays” and, “Green transportation day” (St. Gerard, 2008). The curriculum is linked to a green topic. The schools have healthy learning environments for the children and are saving “energy, resources, and money” (St. Gerard, 2008). The “No Trash Wednesdays” program is where students try to reduce their waste and bring reusable containers so they are not throwing away plastic bags and paper lunch sacks.

Classrooms across the country are starting to incorporate green practices into their curriculum and their teaching activities. Samantha Cleaver wrote the article, “Classrooms are Going Green: How Green Classrooms are Reconnecting Kids with Nature” (2007). Her article focused on how many children do not spend much time outside. Getting children out of the classroom is making an impact on their study habits and their concern for the environment. Also, bringing the environment indoors is helping students become more environmentally aware.

A teacher at Green Woods Charter School in Pennsylvania has gotten her classroom involved in composting. The children collected food scraps and then learned what happens to their lunch (Cleaver, 2007). This Pennsylvania class is learning a lesson in insects, soil, and the environment all in one activity. Cleaver gives advice about how to teach children to be concerned for the environment without scaring them. Talking about the ice caps melting and polar bears losing their habitat may create “ecophobia” (Cleaver, 2007). Instead, have children enjoy the outdoors first and then discuss the concerns they face. Doing so will get the children interested in doing their part. This is the best way to get children to want to play a role in helping with the environment. Children will become more interested in recycling, conservation, etc.

Another school that is joining the composting activity is the Epping Elementary School in Epping, New Hampshire. Lisa Madison has led the composting craze in her school. After introducing the lesson to her classroom, the children were very excited about raising worms and collecting food scraps to feed them (Jobin, Madison, Rydant, 2006). The soil that the classrooms composted was later transferred to the gardens that the school started. Each classroom had their own plot that was used as a teaching tool by the teachers. The vermi-composting lessons met many of the states standards for math, science, music, art, and social studies. Madison and other teachers tried to incorporate the idea that this was a program for “humankind’s relationship with our Earth” (2006). This theme was to help children realize that composting was not just a fun activity, but they were helping the environment at the same time.

GREEN ORGANIZATIONS

David Newnham wrote the article, “Green Fingers?” about eco schools in the United Kingdom. In Manchester, United Kingdom, a simple painting project turned a school into an eco-friendly school. The school wanted to paint some outside walls blue, but decided to go with murals instead. The murals inspired school gardens, which then inspired teachers, students, and parents to start composting and recycling. These efforts gave them a greater awareness of the environment and nature. The school ended up winning the green flag, which is a top award for an eco-school (Newnham, 2005).

Will Rogowski, who works for the United Nations, started to take notice of the school and all of its environmental efforts. Mr. Rogowski, like many other environmental leaders realized by not scaring the students with environmental issues, but informing them as to what they can do has the greatest benefits. Rogowski stated in the “Green Fingers?” article, “You can never ignore the power of children to influence their parents,” (Newnham, 2005).

All of this leads to creating a generation that is eco-conscious. It is important to inform all children of being environmentally aware. Helping the environment should be a global effort. The school in Manchester has promoted being linked with schools in other countries. Children should be aware of what is going on in other countries as well as their own. It brings children of the same generation in different parts of the world together for one common effort of becoming eco-conscious and making good decisions for our planet (Newnham, 2005).

One more green organization is the Environmental Education Alliance (EEA) of Georgia. This organization reaches out to teachers and environmental educators. The alliance hosts

workshops and conferences teaching activities to engage children in the outdoors and becoming more environmentally friendly (www.eealliance.org, 2009).

Every year the EEA hosts a conference called, the Outdoor Classroom Symposium. The topic for 2008 was recycling and outdoor teaching methods. The topic for the 2009 conference will be gardening with students and creating school gardens. The conference has workshops and meetings about engaging students in these type of activities ([www.eeallince.org](http://www.eealliance.org), 2009).

ENVIRONMENTAL PROGRAM STUDIES

Gerald Culen and Preethi Mony did a study on, “Assessing Environmental Literacy in a Nonformal Youth Program” (2002). The program was focusing on 4-H students who participated in environmental education activities in Florida. Culen and Mony assessed their knowledge of ecological concepts, environmental issue awareness, knowledge and skill in the use of environmental action strategies, and evaluation of environmental issues and responsible citizenship behavior (2002). The study was to assess whether environmental programs and activities changed students’ attitudes and behavior. Students were tested in 1998 and then again in 2001-2002. In 1998 the students who had participated in environmental education activities scored higher on all tests than those who did not. The same happened when they were re-tested in 2001-2002. The study confirmed that to encourage good environmental behavior the environmental education curriculum should focus on developing skills to start that behavior. The study also can be used to help assess the most useful curriculum efforts in environmental education (Culen & Mony, 2002).

Tina Metzger and Douglas McEwen wrote an article called, “Measurement of Environmental Sensitivity,” which was published in the Journal of Environmental Education

(1999). This article is about measuring environmental sensitivity, (ES), in children. Metzger and McEwen state, “One of the primary goals of environmental education is to encourage more environmentally responsible behaviors,” (1999). The article references Sia, Hungerford, and Tomera who say that “perceived skill in environmental actions and strategies, knowledge of environmental action strategies, and environmental sensitivity are the three major predictors of responsible behavior,” (1999).

The study developed an instrument that measures environmental sensitivity. The instrument helps measure and document changes in children who are exposed to an environmental education experience. This is a Likert-scale type instrument to help measure environmental sensitivity. The instrument was called the, “Environmental Sensitivity Questionnaire, (ESQ),” (1999). The questionnaire tailored questions to the activity the children were involved in. During this activity the children kept journals that were used to help track their environmental sensitivity changes. The results at the end of the study indicate that the environmental sensitivity of the children increased. Tailoring the ESQ to the curriculum that the children were taught and participated in played a vital role in measuring the children’s environmental sensitivity.

Another study that used a questionnaire was the study conducted by Amy Malkus and Lynn Musser. Malkus and Musser did a study to link children’s positive attitudes about the environment to positive feelings they have about themselves. The Children’s Attitudes Toward the Environment Scale (CATES) was used to measure their environmental attitudes (Malkus & Musser, 1993). The CATES is a twenty-five item questionnaire about environmental attitudes. An example of a statement is, “Some children feel that it is okay to litter and other children feel

it is not okay to litter.” The children will check which statement they feel most strongly about. There is a big and a small box under each statement. They will first select which statement they feel most strongly about and then check the big box if they feel very strongly about the statement or the small box if they feel somewhat strongly about the statement. These boxes are then ranked on a one to four scale for the administrators to use when analyzing the data (Malkus&Musser,1993).

After the study was completed and the children’s perceived confidence was measured, they found children with higher confidence levels felt more positively about the environment (Malkus & Musser,1993). The researcher’s predictions about children’s attitudes were confirmed. Malkus and Musser’s study proved to be successful and their CATES instrument proved to be valid and reliable.

All of these programs and studies are examples of environmental education. The literature helped shape the “Growing Up Green” program. Each article provided good examples and information. The studies that were done, such as the CATES questionnaire and the Culen and Momy study focus on environmental knowledge, attitudes, and behavior of students. Therefore, the “Growing Up Green” program will test children on all three aspects. This will help with the evaluation process of the study.

CHAPTER 3

METHODOLOGY

The purpose of this study was to assess whether a “green program” changes attitudes, knowledge, and behaviors of children to become more pro-environmental. The children were tested before the program, “Growing up Green,” was delivered and then again after the program. This was to assess if the children gained knowledge and changed their attitudes and behaviors after engaging in a green program.

POPULATION

The population was approximately 35 to 40 students at H.B. Williams Elementary School. This elementary school is in White House, TN in Sumner County. The ages ranged from nine to eleven years old in the fourth grade at H.B. Williams. All students’ parents were asked to sign a permission slip to have their child participate in the CATES questionnaire. The principal also, gave permission for this study to be conducted at her school.

Fourth graders were chosen for this study because, Malkus and Musser used fourth grade age students in their study for the CATES scale, which was used to test environmental attitudes (Malkus & Musser, 1993). Also, in the fourth grade recycling is part of their science curriculum. Students learn about matter and how matter can change from one form to another through recycling (McGraw-Hill, 2002). This program is a good way to expand upon what they were learning already in their science curriculum.

INSTRUMENT DESIGN

The instrument for this study was composed of three parts. The first part was an attitude assessment scale. The scale used was the Children's Attitudes Toward the Environment Scale (CATES). This scale was developed by Amy Malkus and Lynn Musser. They developed this scale originally to do a study linking children's positive attitudes toward the environment with the positive attitudes and confidence they feel about themselves (Malkus & Musser, 1993). The scale was a twenty-five item parallel positive and negative questionnaire about attitudes toward environmental issues. An example question looks like this,

Some children turn the lights off when they leave a room

Always Like Me Sometimes Like Me

but other children leave the lights on

Always Like Me Sometimes Like Me

The children then decide which statement they agree with. After the children chose which statement they associated themselves with, they circled always like me or sometimes like me. An example is, if a child associated with turning the lights off when leaving a room, but knew they did not always turn the lights off when leaving a room they circled "Sometimes Like Me." Each statement is ranked from one to four. One is least pro-environmental and four is most pro-environmental. An example from the question above is the children who circled "Always Like Me," under the "But other children leave the lights on," they would have received one point for that question. The "Always Like Me," for the previous statement is the least pro-environmental answer for that set.

The range of scores for the attitudes test is from 25 to 100. The score of 25 associated a child with being the least pro-environmental. A score of 100 associated a child with being the most pro-environmental. The mid-range for the attitudes assessment scale is a 62.5. Evidence of reliability for this scale was provided by a Cronbach's Alpha score (Malkus & Musser, 1993).

The second part of the instrument was a knowledge test composed of 15 multiple choice questions. These 15 questions were based upon composting, recycling, and conservation. For every question that the students answered correctly, they received one point. The most points they could earn was fifteen. The fewest amount of points was zero. This part of the instrument was useful to test the children's knowledge before the green education program. The questions were research based and correlated to the green education program they were taught.

The third part of the instrument was a behaviors checklist. The test was composed of different behaviors with a box next to each. The children checked the behaviors they currently participated in. An example of a behavior is, "I recycle newspapers after they are read." If this was true, the child checked that box. Checking the behavior boxes, helped track what the children already did and if their behaviors increased after the green education program. The children also got one point for these questions, too. If they checked the box then they received a point. For each box they did not check they received zero points for that behavior.

After the children's attitudes, knowledge, and behaviors were tested there was a small demographic section. The demographic section asked for their gender, the type of community they lived in (urban, suburban, or rural), and if they have had an environmental education program before.

The green education program taught to the children was called, “Growing up Green.” This was a research-based program focused on conservation, composting, and recycling. The study taught the children they can help the environment by recycling, conserving energy, and other environmental practices. After the program was taught the children were given the instrument two weeks later to see if their attitudes, knowledge, and behaviors toward the environment increased or decreased.

DATA COLLECTION

Data was collected before the, “Growing Up Green” program and after the program. Before the program was given, the research instrument testing their attitudes, knowledge and behaviors was administered. The study started out by reading aloud the pre-test to the children. Each question was read from the CATES questionnaire and the children were instructed to identify with one of the statements for each question. They then had to circle if the statement they identified with was Always Like Me or Sometimes Like Me. After the CATES questionnaire was finished they then moved on to the knowledge portion of the pre-test. The knowledge section of the pre-test was fifteen multiple choice questions. After the knowledge section, there was a behaviors checklist. The checklist was fifteen behaviors about different products to recycle, ways to save energy, and composting. After the checklist there was a small demographic section asking gender, community they live in, and if they had participated in an environmental program before.

After the pre-test was finished the children were taught the, “Growing Up Green” program. The children were left with worksheets to work on, places in their community to drop off recyclables, and instructions about activities they can do to help the environment at home and

at school. Two weeks later after the children were pre-tested they were tested again to see if their attitudes, knowledge, and behaviors changed. Again, the test was read aloud to the children. The data was analyzed to see if these three components increased, decreased, or stayed the same.

ANALYSIS OF DATA

The data analysis program used was the Statistical Package for the Social Scientists (SPSS) Version 17. When data was entered into the SPSS program means, frequencies, and descriptive statistics were reported. All of this information was used in determining if the students' knowledge, behavior, and attitudes changed. Therefore, this provided information to determine if the, "Growing Up Green," program made a change in the students.

CHAPTER 4

FINDINGS

Chapter four displays the pre and post-test scores of the children who participated in the “Growing Up Green,” program. Chapter four is divided into sections based upon the three different objectives. With the objectives there is a set of secondary variables that relate to each. These secondary variables are gender, community, and if a child has been taught an environmental education program before.

POPULATION

The children who participated in this study were fourth graders at H.B. Williams Elementary School, in White House, Tennessee. They ranged in ages nine through eleven. There were thirty-six children who participated in the pre and post-test. The children are from rural and suburban communities. Many of the children had already participated in an environmental education program before.

The next three tables show the secondary variables from the study. These variables are gender, community, and if a child had been taught an environmental education program before. Each table displays how many males versus females in the study, how many children living in a rural community versus suburban community, and the how many children had participated in an environmental program before versus the children who had not participated in an environmental program before. The variables give more insight on how the children answered questions on the pre and post-test.

Table I. Gender of Population

Gender	Number	Percentage %
Male	20	55.6
Female	16	44.4
Total	36	100.0

Table II. Community

Community	Number	Percentage %
Rural	3	8.3
Suburban	33	91.7
Total	36	100.0

Table III. Participated in an Environmental Education Program Previously.

Environmental Program	Number	Percentage
Yes	22	61.1
No	14	38.9
Total	36	100.0

OBJECTIVE 1

Determine changes in environmental attitudes of children after they are taught a green education program.

The study shows that the Cronbach's Alpha for the pre-test was 0.609. The Cronbach's Alpha for the post-test was 0.697. Although these are acceptable, the questions were not changed because it would not have proved a large enough change. All twenty-five questions were kept, because changing the questions would not have improved the reliability results greatly.

The next table, Table IV, shows the difference in attitudes from the pre and post-test. Only thirty children's tests were used for this section. Some children did not answer all the questions, therefore their tests could not be used. The table shows that the children's attitudes went down from the pre to post-test. However, it was only a slight change in attitudes.

The attitude scores were on a scale from 25 to 100. 25 is the lowest and 100 is the highest. The mid-range score is 62.5. Table IV shows that the children scored in the positive attitudes range on the pre and post-test.

Table IV. Difference in Attitudes Score Pre and Post-Test

Score	Number	Mean	Standard Deviation
Pre Treatment	30	73.97	7.35
Post Treatment	30	73.20	7.53

The next three tables show the secondary variables associated with attitudes toward the environment. Table V, shows gender differences, Table VI, community differences, and Table VII, shows the differences between children who have had an environmental education program before and those who have not. Each of the secondary variable tables display the standard deviation for the pre and post-test. The standard deviation shows how close each of the children's scores are to the mean. The lower the standard deviation, the closer all the children's scores were to the mean. The standard deviation shows if children have scores in the same close range or all over the board in a broad range.

The males' attitudes in Table V show a slight increase. The females' attitudes decreased by 2 points. Both male and female attitudes changed, but they remained positive on both pre and post-test.

Table VI, shows the values of the children who lived in different communities. While the children who live in rural communities had the same values for the pre and post-test, the children who live in suburban communities had a slight decrease in their values. Both values from the pre and post-tests remained in the positive range.

Table VII, shows the effects on attitude from the students who have already had an environmental program before, and those who had not. Children who had been taught an environmental education program before and those who had not both scored in the positive attitudes range on the pre and post-test. The values for those who have had a program before and those who had not slightly went down from the pre and post-test.

Table V. Gender Effects on Attitudes Pre and Post-Test

Gender	Number	Mean	Standard Deviation
Male			
Pre Treatment	18	74.17	8.25
Post Treatment	18	74.56	6.94
Female			
Pre Treatment	12	73.67	6.08
Post Treatment	12	71.17	8.22

Table VI. Relationship of Community Effects on Attitudes

Community	Number	Mean	Standard Deviation
Rural			
Pre Treatment	2	71.00	9.90
Post Treatment	2	71.00	8.49
Suburban			
Pre Treatment	28	74.18	7.32
Post Treatment	28	73.36	7.61

Table VII. Already Having an Environmental Education Program Before, Effects on Attitude

Environmental Program	Number	Mean	Standard Deviation
Yes			
Pre Treatment	19	73.11	7.10
Post Treatment	19	72.00	8.10
No			
Pre Treatment	11	75.45	7.87
Post Treatment	11	75.27	6.23

OBJECTIVE 2

Test children's knowledge about living green before a green education Program, and determine if their knowledge increases after the program.

The knowledge portion of the test was made up of fifteen multiple choice questions about recycling, composting, and energy conservation. The children's scores went up in this portion of the test. The mean values went up a full point from the pre and post-test. The range for the mean was zero to fifteen. Zero is the lowest and fifteen was the highest score. Their mean score for knowledge was above 7.5, which was about half of the behaviors on the checklist. (See Table VIII).

The next three tables show the secondary variables for the knowledge portion of the test. All the values for the secondary variables increased. The values were a nine or above. Therefore, the children answered more than half of the questions right. They had a score of nine and above for the pre and post-test.

The males and females increased their scores for the knowledge test. Table IX, shows the males increased by a full point from the pre to post-test. The females' score also increased. Both the males and females answered more than half of the questions right in the knowledge test.

Table X, shows rural and suburban community students increased their scores in the knowledge test. The rural and suburban students also answered more than half of the questions right. The scores ranged between nine and ten for the pre and post-test.

Table XI, shows the students who have had an environmental program before and those who have not. Regardless of their previous environmental programs both, groups increased from pre to post-test. Again, they scored between the nine to ten range, meaning they answered more than half of the questions right for the knowledge test.

Table VIII. Knowledge Test

Knowledge	Number	Mean	Standard Deviation
Pre Treatment	36	9.16	1.59
Post Treatment	36	10.16	1.63

Table IX. Gender Effects on Knowledge

Gender	Number	Mean	Standard Deviation
Male			
Pre Treatment	20	9.1	1.77
Post Treatment	20	10.4	1.42
Female			
Pre Treatment	16	9.25	1.39
Post Treatment	16	9.87	1.85

Table X. Community Effects on Knowledge

Community	Number	Mean	Standard Deviation
Rural			
Pre Treatment	3	9.0	2.64
Post Treatment	3	10.67	0.57
Suburban			
Pre Treatment	33	9.18	1.53
Post Treatment	33	10.12	1.69

Table XI. Already Having an Environmental Education Program Before, Effects on Knowledge

Environmental Program	Number	Mean	Standard Deviation
Yes			
Pre Treatment	23	9.04	1.66
Post Treatment	23	10.43	1.47
No			
Pre Treatment	13	9.38	1.50
Post Treatment	13	9.69	1.84

OBJECTIVE 3

See what behaviors the children currently have before a green education program and if their behaviors change after they have been taught the program.

The third part of the test was a check list of environmental behaviors. These behaviors included recycling different items, composting, and conserving energy in different ways. The children’s scores did slightly decrease from the pre to post-test. However, the children on the pre and post-test were doing either half of the behaviors or more both times, when they were tested. (See Table XII).

The next three tables show the values for the secondary variables on the behaviors checklist. Many of the values for the behaviors went down. The behaviors values decreased but not substantively. The children were participating in half of the behaviors or more from the pre to post-test.

Table XIII, shows the gender effects on behavior. The male’s scores increased slightly, by a tenth of a point from the pre to post-test. The female’s scores went down minimally. Both males and females were doing half of the behaviors listed from the checklist on the pre-test and post-test.

Table XIV, shows the community effects on behavior. The rural students and suburban student's values for behaviors went down. The rural students participated in fewer behaviors than the suburban students. Even though their scores went down, it was only a slight change from the pre to post-test.

Table XV shows behavior effects on children who have had an environmental program before and those who had not. The students who had a program before showed no change from the pre to post-test. The ones who had not had a program before had a slight decrease from pre to post-test. Again, both groups of students were participating in half of the behaviors or more from the pre to post-test.

Table XII. Behaviors Test

Behavior	Number	Mean	Standard Deviation
Pre Treatment	36	8.16	2.74
Post Treatment	36	7.88	3.02

Table XIII. Gender Effects on Behavior

Gender	Number	Mean	Standard Deviation
Male			
Pre Treatment	20	8.40	3.08
Post Treatment	20	8.55	3.48
Female			
Pre Treatment	16	7.87	2.30
Post Treatment	16	7.06	2.11

Table XIV. Community Effects on Behaviors

Community	Number	Mean	Standard Deviation
Rural			
Pre Treatment	3	6.33	3.78
Post Treatment	3	5.66	1.15
Suburban			
Pre Treatment	33	8.33	2.64
Post Treatment	33	8.09	3.05

Table XV. Already Having an Environmental Education Program Before, Effects on Behaviors

Environmental Program	Number	Mean	Standard Deviation
Yes			
Pre Treatment	23	7.56	2.87
Post Treatment	23	7.56	3.10
No			
Pre Treatment	13	9.23	2.20
Post Treatment	13	8.46	2.87

CHAPTER 5

“Growing Up Green:” A Study Focusing on Environmental Attitudes, Knowledge and Behaviors of Elementary Children.

Abstract

“Growing Up Green,” is a research based environmental education program that teaches children about recycling, energy conservation, and composting. This program was taught to fourth grade students at H.B. Williams Elementary School, in White House, Tennessee. The children were given a pre-test before the program and a post-test two weeks after the program. The pre and post-test was composed of three parts. The three parts tested their environmental attitudes, knowledge, and behaviors. The study found that most of the children already had positive attitudes toward the environment. While, their attitudes decreased minimally after the program, they still remained very positive. The children did well on the knowledge test. Their environmental knowledge increased after the “Growing Up Green,” program. While the program did not appear to have a substantive impact on their environmental behavior adoption, the children already participated in some behaviors like recycling and conserving energy before the program, and continued these behaviors after the program, too.

Introduction

There is a trend in America and around the world now about becoming more conscious of the environment and doing our part in recycling and conserving our natural resources. The green movement is catching on with celebrities and the media. Elizabeth Rogers and Thomas Kostigen co-wrote, *The green book* (2007). They have celebrities in the book endorsing living green. Television shows now focus on eco-friendly living. Businesses and schools are trying to become eco-friendly, too. Many builders are starting to build eco-friendly buildings. They may be expensive at first, but in the long run they are saving costs on energy (Rogers & Kostigen, 2007).

Many people who are in support of being environmentally friendly feel that this way of living should start with children. If children start off living an eco-friendly way, then it is more likely that they will continue this into their adulthood. Schools and their curriculum are now starting to incorporate these ideas into the classroom. Samantha Cleaver stated, “Across the country environmental education schools and the growing movement to get children outdoors are challenging the current ‘indoor generation’ of kids” (2007). School gardens are becoming increasingly more popular. Gardening helps get children outside and learn in an outdoor classroom environment.

If children start to enjoy and spend more times outdoor they might become interested in helping take care of the environment and the Earth. Many people feel that they need to make a big impact when helping. Just a few small changes can help with the overall environmental impact. Leigh O’Brien stated, “Even the youngest children can learn to rinse out jars and bottles, and to put those old newspapers in the recycling bin” (2007).

The hope is if children become interested in this, their parents will, too. David Newnham's article, "Green Fingers," is about green programs in schools. Newnham states "Educating children is the key to educating the community: You can never ignore the power of children to influence their parents" (2005). Children will hopefully take the information they learn at school home and share it with their parents (Newnham, 2005).

Therefore, becoming environmentally friendly is a trend focusing on children and adults. Adults can start to change their habits and children will learn these habits at a young age. These habits will hopefully continue into their adulthood.

Literature Review

There is an abundance of literature on living green and how to teach this concept to children. Organizations were formed to aid in the process of teaching children about becoming eco-friendly and how to help people live this way. Many articles were submitted to educational journals about schools that have changed their teaching methods and how environmental programs that have met many of their curriculum criteria.

Many schools have adopted the green way of living. "Savvy Schools Are Going Green," is an article written by Vanessa St. Gerard (2008). The article talks about teaching green methods through hands-on activities involving the children. They have themed days like, "No trash Wednesdays," and "Green transportation day" (St. Gerard, 2008). They link their curriculum to green topics and focus on saving energy, resources, and money (St. Gerard, 2008).

The "Growing Up Green" program taught the children about composting indoors and outdoors. Epping Elementary School in Epping, New Hampshire taught worm composting to their students (Jobin, Madison, Rydant, 2006). The children loved to raise the worms and

collecting food scraps to feed them. The compost created by the worms was then transferred into the gardens at Epping Elementary (Jobin, Madison, Rydant, 2006).

Besides teaching about green methods, organizations have formed to help support teaching green methods to children. The Environmental Education Alliance of Georgia (EEA), is an organization that hosts workshops and classes for teachers and environmental educators (www.eealliance.org, 2009). The workshops give the teachers ideas of how to teach and engage the students in environmentally friendly activities. They host an annual conference called the, “Outdoor Classroom Symposium.” Each year the subject areas change (www.eealliance.org, 2009). In 2008 the subject area had workshops focusing on recycling and outdoor teaching. The 2009 conference will focus on gardening with children and creating school gardens (www.eealliance.org, 2009).

The United Nations has also started to support green methods of teaching. Will Rogowski supports and recognizes the efforts of schools. He supported a school in the United Kingdom that won the Green Flag award for participating in green activities (Rogowski, 2005). Will supports the idea of children becoming interested in living green and passing this information along to their parents. He states, “You can never ignore the power of children to influence their parents” (Rogowski, 2005).

Many environmental research studies have been conducted on children. Instruments have been designed to help with the research. Gerard Culen and Preethi Mony studied 4-H students who participated in environmental education activities. The study they conducted was called, “Assessing Environmental Literacy in a Nonformal Youth Program” (Culen & Mony 2002). The

study evaluated whether environmental programs changed any of the students attitudes or behavior (Culen & Mony, 2002).

Another study was conducted by Tina Metzger and Douglas McEwen. They held a study measuring environmental sensitivity (Metzger & McEwen, 1999). They stated, “One of the primary goals on environmental education is to encourage more environmentally responsible behaviors,” (Metzger & McEwen, 1999).

One study conducted measured Children’s Attitudes Toward the Environment with the CATES scale. The researchers were Amy Malkus and Lynn Musser (1993). They developed the CATES instrument, Children’s Attitudes Towards the Environment Scale. The CATES test was used to measure the environmental attitudes in the, “Growing Up Green,” program.

Malkus and Musser’s instrument is a twenty-five item questionnaire measuring environmental attitudes (1999). The children answer which statement they identify with and how strongly they relate to that statement. The statements are then scored on a one to four scale (Malkus & Musser, 1993). This is exactly how the attitudes were measured in the pre and post-test for the, “Growing Up Green,” study.

All of the literature helped create the, “Growing Up Green,” program. The literature helped the researcher decide what areas to include in the study. Recycling, energy conservation, and composting are the three major subjects involved in this green education program. The Children’s Attitudes Toward the Environment Scale was a good way to measure the attitudes of the children before the program, and if their attitudes changed after the program.

Purpose and Objectives

The purpose of the study was to assess whether a “green program” changes attitudes, knowledge, and behaviors of children to become more pro-environmental. The children were tested before the program, “Growing Up Green,” and then again two weeks later. The results helped assess if the children’s attitudes, knowledge, and behaviors had increased, decreased, or stayed the same.

The objectives of the program were:

- 1) Determine changes in attitudes of children after they are taught a green education program;
- 2) Test children’s knowledge about living green before a green education program, and determine if their knowledge increases after the program; and,
- 3) See what behaviors the children currently have before a green education program and if their behaviors change after they have been taught the program.

Methods

The study was conducted in two fourth grade classrooms at H.B. Williams Elementary School, in White House, Tennessee. There were thirty-five to forty students that participated in the study. The ages of the children were from nine to eleven years old. Each class was given the program and the tests separately.

The testing instrument was developed by using the Children’s Attitudes Toward the Environment Scale (CATES), by Amy Malkus and Lynn Musser. The CATES was used to measure their attitudes toward the environment. The second part of the test was the knowledge portion. These fifteen multiple choice questions were based upon the materials taught in the,

“Growing Up Green,” program. The third part of the test was a behaviors checklist. These behaviors were also based upon the, “Growing Up Green,” program. The behaviors covered recycling, energy conservation, and composting.

The study started out by reading aloud the pre-test to the children. Each question was read from the CATES questionnaire and the children were instructed to identify with one of the statements for each question. They then had to circle if the statement they identified with was Always Like Me or Sometimes Like Me. After the CATES questionnaire was finished they then moved on to the knowledge portion of the pre-test. The knowledge section of the pre-test was fifteen multiple choice questions. After the knowledge section, there was a behaviors checklist. The checklist was fifteen behaviors about different products to recycle, ways to save energy, and composting. After the checklist there was a small demographic section asking gender, community they live in, and if they had participated in an environmental program before.

When the pre-test was completed the children were then taught the “Growing Up Green,” program. The children got to help make a worm compost bin for their classroom. They learned how the bin works, how to construct a bin, take care of the bin, and what to feed the worms. The bin was kept in the classroom for them to observe the worms eating the children’s food scraps. The food scraps would then be digested by the worms and become compost to use in a garden.

The children also learned new ways to conserve energy, and shared ways they conserved energy at school and home. The students shared some information they already knew about recycling. They also learned how to identify if a plastic product can be recycled or not and information about recycling other products. The students were given a re-usable canvas bag for grocery shopping with their parents or other adults. Inside the bags were activity books about

recycling and energy conservation. There were also instructions on how to make a worm compost bin, where to take recycled goods in their area, and buttons and pencils to use.

Two weeks later the children took the post-test. The post-test was the same as the pre-test. The post-test was given exactly as the pre-test was given. Each one of the CATES twenty-five statements was read aloud to the students. The post-test followed the same format with the CATES questionnaire first, knowledge test second, behavior checklist third, and finally the demographic section.

The results were recorded and entered into SPSS Version 17. All answers were coded to help give results about whether any changes had been made in their attitudes, knowledge, and behaviors.

Findings

Objective 1: Determine attitudes in children after they are taught a green education program.

Table IV shows the attitudes in the children slightly decreased from the pre-test to post-test. Only thirty children's answers were used in attitudes. Some of the children's answers were not used because they failed to answer every question. Although their scores decreased they still represent positive attitudes.

The attitudes scale is based upon a scale of 25 to 100 points. A score of 25 indicates having a very negative attitude and 100 indicates having a very positive attitude. 62.5 is the middle of the range score. The children's mean score was 73. Therefore, the children started out already having positive attitudes toward the environment. There was very little difference in pre and post-test scores.

Table IV. Difference in Attitudes Score Pre and Post-Test

Score	Number	Mean	Standard Deviation
Pre Treatment	30	73.97	7.35
Post Treatment	30	73.2	7.53

Secondary variables were also studied to determine potential effects on the treatment. Differences in gender, community, and if a child had received an environmental education program before were taken into consideration. One of the secondary variables that stood out was, the attitudes of the males. The males were the only group of secondary variables for attitudes that increased their score from pre to post-test. (See Table V).

Objective 2: Test children’s knowledge about living green before a green education program, and determine if their knowledge increases after the program.

The second objective studied was the knowledge test that the children did. The results for the knowledge test were positive. The children’s scores increased from the pre to post-test. All of the secondary variables went up, too. The results show that their mean score for the knowledge went up by a point.

Table V. Gender Effects on Attitudes Pre and Post-Test

Gender	Number	Mean	Standard Deviation
Male			
Pre Treatment	18	74.17	8.25
Post Treatment	18	74.56	6.94
Female			
Pre Treatment	12	73.67	6.08
Post Treatment	12	71.17	8.22

Table VIII. Knowledge Test

Knowledge	Number	Mean	Standard Deviation
Pre Treatment	36	9.16	1.59
Post Treatment	36	10.16	1.63

The next two tables show all the other secondary variables went up by a point or more except for the females and those who had not been taught an environmental education program before. Their scores went up, but not as much as the others. The males went up by more than a point. However, the females only went up by 0.6 of a point. The students who had been taught an environmental program previously went up more than those who had not been taught an environmental program. The rural and suburban students' scores increased, too on the knowledge test. Table X, shows the results of community effects on behavior. Some knowledge was gained from the pre to post-test. (See Tables IX and X).

Table IX. Gender Effects on Knowledge

Gender	Number	Mean	Standard Deviation
Male			
Pre Treatment	20	9.1	1.77
Post Treatment	20	10.4	1.42
Female			
Pre Treatment	16	9.25	1.39
Post Treatment	16	9.87	1.85

Table X. Community Effects on Knowledge

Community	Number	Mean	Standard Deviation
Rural			
Pre Treatment	3	9.0	2.64
Post Treatment	3	10.67	0.57
Suburban			
Pre Treatment	33	9.18	1.53
Post Treatment	33	10.12	1.69

Objective 3: See what behaviors the children currently have before a green education program and if their behaviors change after they have been taught the program.

Objective three focuses on environmental behaviors. The behaviors on the checklist were recycling, conservation, and composting behaviors. The behavior scores were positive, but they did go down from pre-test to post-test (See Table XII). Out of a fifteen item checklist the mean score before was 8.16, which is about half of the behaviors. The post-test score decreased slightly.

Even though the overall score of behaviors went down the males' score increased. It was only a .15 increase, but it was more than any of the other variables. (See Table XIII).

Table XI. Already Having an Environmental Education Program Before, Effects on Knowledge

Environmental Program	Number	Mean	Standard Deviation
Yes			
Pre Treatment	23	9.04	1.66
Post Treatment	23	10.43	1.47
No			
Pre Treatment	13	9.38	1.50
Post Treatment	13	9.69	1.84

Table XII. Behaviors Test

Behavior	Number	Mean	Standard Deviation
Pre Treatment	36	8.16	2.74
Post Treatment	36	7.88	3.02

Table XIII. Gender Effects on Behavior

Gender	Number	Mean	Standard Deviation
Male			
Pre Treatment	20	8.40	3.08
Post Treatment	20	8.55	3.48
Female			
Pre Treatment	16	7.87	2.30
Post Treatment	16	7.06	2.11

Conclusions

Many factors can be taken into consideration for the conclusions of this study. The secondary variables provide interesting information for the three main objectives. The secondary variables also, give a better idea of who really gained more knowledge and scored higher on the pre and post-test.

Based upon the findings one can conclude that the students already had positive attitudes toward the environment. The mid range score for the attitudes was a sixty-two. The students on both pre and post-test scored in the seventies. That is on the positive end of the scale of twenty-five to one-hundred.

Gender seemed to affect the attitudes score. The males scored higher than the females on both pre and post-test. Their score slightly went up, while the females score slightly went down on the post-test. This group of males had more positive attitudes toward the environment.

It can be concluded that knowledge did go up from the pre-test to post-test. The mean score of knowledge went up by one point. Even though the knowledge did not go up a significant amount, a small increase shows the student's knowledge improved from the pre to post-test. The children gained more knowledge and scored higher on this portion of the test. The, "Growing Up Green," program might have introduced some knowledge they did not know when they were taking the pre-test. Worm composting is something that many of the children did not seem to know anything about. In their classroom and science curriculum they already had discussions on recycling, but not composting.

The overall knowledge went up on the test and all of the secondary variables went up, too. Both genders, communities, and those who had and had not been taught an environmental

program scores went up. Many people say that knowledge is the first step to changes in attitudes and behaviors.

One can conclude that the children were already doing about half of the behaviors on the checklist. The pre-test overall mean score was an 8.16. Out of a fifteen item checklist that is a little more than half of the behaviors. Even on the post-test the mean score showed the children were still doing half of the behaviors.

Many of the children practiced the same behaviors. The most popular behaviors were: turning off lights when leaving a room, recycling aluminum cans, taking quick showers instead of baths, and turning off water while brushing teeth. These were the most common behaviors checked by the students for the pre and post-test. The behaviors such as: composting food scraps, unplugging appliances, and carpooling to school were not as popular. The students that engaged in these behaviors were being pro-environmental.

It was interesting to find that the children who had not been taught an environmental program before actually had the highest mean score on the behaviors. Their pre-test score was a 9.23 and their post-test was an 8.46. Their pre-test score was higher than any of the other secondary variables. They seemed to already model positive behaviors toward the environment.

Again, the males did well. Their behaviors improved from the pre to post-test. They went from an 8.40 to an 8.55. Even though it is a slight improvement, it is better than no improvement.

From the secondary findings one may conclude that the males in the class were more pro environmental than the females. Their scores were always higher than the females' scores.

Their greatest high score was in the attitudes post-test. The males stayed with 74 points, while the girls fell to a 71.

One researcher studied that there might be a reason for males to do better in an environmental education study than girls. Sarah Carrier, wrote the article, “Environmental Education in the Schoolyard: Learning Styles and Gender” (2009). Carrier’s study used four fourth and fifth grade classrooms in a state in the southeastern United States. She wanted to see if different methods of learning and environments had an effect on gender. She used two classrooms to learn hands-on activities outside, and the two other classrooms to learn the same lesson inside, but with less hands-on activities. Both classrooms received the same amount of information (Carrier, 2009). Her study showed that the boys who were outside learning with hands-on activities scored significantly higher than the boys who were learned traditionally inside the classroom. The girls inside and outside scored lower than the boys (Carrier, 2009). Her study concluded that girls prefer the traditional indoor classroom method, while boys prefer outdoor hands-on activities (Carrier, 2009). This could explain why the boys in the, “Growing Up Green,” study did better than the girls

The “Growing Up Green” program used many hands-on activities. Even though they were not outside, they boys and girls both got to touch worms, build a worm bin, touch recyclable products, and practice energy conservation methods. Carrier’s study proves that boys seem to do better with hands-on activities. The boys in Carrier’s study increased their environmental attitudes, behaviors, and knowledge when engaged in hands-on learning activities (Carrier, 2009). If the style of teaching was reversed and the students sat still in their seats and

listened to me talk to them about environmental practices the girls might have scored higher than the boys.

Implications and Discussion

Many factors could have affected the scores on the tests. Two weeks is not a very long time to try to change children's attitudes and behaviors. If the children possibly had a longer time period to learn about becoming more environmentally friendly their scores might have been different. A longer time period could have changed their attitudes more positively and give them more time to try some of the behavior changes.

One factor that could have greatly affected the scores was that the children were taking the post-test on the second to last day of school. These last few days of school are not the usual structured days they are used to. Many minds are already wandering towards summer break and not on school work. The teacher was not instructing anymore and filling the time with busy work. This post-test could have seemed more like busy work, and the children might have rushed through it to finish it quickly.

Also, a series of lessons could improve the results. It is hard for a nine to eleven year old to absorb all this knowledge in such a short period of time. A series of lessons would be beneficial to keep introducing the subject to the child. Recycling is part of the fourth grade curriculum. However, composting is not and conserving energy is not as focused on heavily.

Overall, there was positive feedback about the program. Some of the student's parents called the school and said their child came home all excited about the program that was taught. The whole idea is to introduce new ideas to get the children excited about the environment and

interested in learning more. One activity at school can change a child's interest level about the environment.

Recommendations

These are recommendations on how to improve the program.

1. Try a series of lessons on recycling, composting, and energy conservation. For example try one day focusing only on one subject at a time instead of cramming them all into one day.
2. Do the study not so close to the end of the school year. Many children are not interested in school work when summer break is only a couple of days away.
3. Ask the teacher what their recycling lessons are that they have in their curriculum and expand upon them.

These are recommendations for further study.

4. After the pre-test is given and the “Growing Up Green” program is taught, introduce some of the materials in the CATES test. The CATES test asked some questions about animals and the outdoors. This could help introduce the children to other environmental subjects.

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APPENDICES

Appendix A
Parent or Guardian Permission Slip

Dear Parent or Guardian,

My name is Sarah Smith and I am a graduate student at the University of Tennessee in Knoxville, Tennessee. Later this month, I will be delivering an environmental education program to the students in your child's school, and in an effort to evaluate the effectiveness of that educational program, both prior to and after the program is delivered to students, I would like to collect some information from participants regarding their attitudes about the environment and their knowledge about recycling, composting and energy conservation.

I would like to obtain permission from you to allow your child to participate in the program and the program evaluation. The program itself will be informative and based upon current environmental education practices and energy conservation practices. The program pre-test and post-test both include a list of questions asking about your child's current knowledge, attitude and practices related to recycling, energy conservation, and composting. While the questions themselves are not of a nature to pose any risk to your child should his/her answers be divulged publicly, I promise that your child's name or his/her individual answers on the assessment instruments will never be reported publicly. Only group aggregate scores will be reported in the final report.

The pre-test will be given before the program is taught. The questionnaire will be read aloud to the students and they will fill out the questionnaire to the corresponding question. After this they will participate in the composting, energy conservation, and recycling program. Two weeks after this program I will come back and re-administer the same questionnaire.

Your child's participation in this project is completely voluntary and he/she will not be penalized if he/she chooses not to participate. The research will have no effect on their grades. Children will still be given the opportunity to participate in the educational program, regardless of whether they complete the questionnaires or not.

Mrs. Brown, the principal at your child's school, has approved this program. You may call Ms. Brown or contact me directly if you have any additional questions about this project.

Thank you.

Sincerely,

Sarah E. Smith
1007 Forest Pointe Dr.
Hendersonville, TN 37075
(615) 289-3200

**Appendix B
Student Assent Form**

Student Assent Form

“Growing Up Green”

Hi:

My name is Sarah Smith and I would like to invite you to participate in a program about the environment that is being conducted by me at your school. As part of the program, you will be asked to complete a questionnaire about environmental education related to recycling, composting and energy saving. I would like to ask you to participate in this program and complete the questionnaires so that we can see if the educational program is effective. However, your participation in the program is completely voluntary. Further, your name will never be linked to your individual answers on your questionnaire in any reports about the program or effect any of your grades. Only group answers will be reported.

The questionnaire will be given before you participate in the program about recycling, composting, and energy saving. This same questionnaire will be filled out again two weeks after the original one, to see if any answers have been changed. The questionnaire will take approximately 30 minutes. Please feel free to ask me if you have any other questions before you complete the questionnaires. Thank you.

Consent:

I have read the above information. By signing below I agree to participate in the program.

Participant's Signature

Date

Appendix C
Pre and Post-Test

Section I.
Attitudes

1. Some children like to leave the water running when they brush their teeth.

Always Like Me Sometimes Like Me

Or

But other children always turn the water off while brushing their teeth.

Always Like Me Sometimes Like Me

2. Some children use both sides of the paper when they draw.

Always Like Me Sometimes Like Me

Or

Other children use only one side of the paper when they draw or write.

Always Like Me Sometimes Like Me

3. Some children think we should recycle things.

Always Like Me Sometimes Like Me

Or

Other children think we should throw things away when were done with them.

Always Like Me Sometimes Like Me

4. Some children like to look at plants and bugs outside but never bring them home.

Always Like Me Sometimes Like Me

Or

Other children like to bring home plants and bugs they find outside.

5. Some children like to feed the birds.

Always Like Me Sometimes Like Me

Or
Other children don't like to feed the birds.

6. Some children think people and animals are both important.

Always Like Me Sometimes Like Me

Or

Other children think animals aren't important.

Always Like Me Sometimes Like Me

7. Some children don't like to camp or play outdoors.

Always Like Me Sometimes Like Me

Or

Other children like to go camping and be outdoors.

Always Like Me Sometimes Like Me

8. Some children give toys to other children or reuse them when they don't play with them anymore.

Always Like Me Sometimes Like Me

Or

Other children throw away toys when they don't play with them anymore.

Always Like Me Sometimes Like Me

9. Some children don't like to pick up smelly trash and throw it away.

Always Like Me Sometimes Like Me

Or

Other children don't like to pick up trash and throw it away.

Always Like Me Sometimes Like Me

10. Some children sort their bottles and cans and recycle them.

Always Like Me Sometimes Like Me
Or

Some children don't sort their bottles and cans.

Always Like Me Sometimes Like Me

11. Some children like to live where there are lots of people.

Always Like Me Sometimes Like Me
Or

Other children like to live where there are lots of plants and animals.

Always Like Me Sometimes Like Me

12. Some children never touch or catch animals they find outside.

Always Like Me Sometimes Like Me
Or

Some children like to touch or catch wild animals.

Always Like Me Sometimes Like Me

13. Some children like to ride with other children even if it is a little crowded.

Always Like Me Sometimes Like Me
Or

Other children don't like being crowded in the car.

Always Like Me Sometimes Like Me

14. Some children think that wild animals need protection.

Always Like Me Sometimes Like Me
Or

Other children think we should be able to hunt and kill all wild animals.

Always Like Me Sometimes Like Me

15. Some children leave the lights on when they leave the room.

Always Like Me Sometimes Like Me

Or

Other children turn the lights off when they leave a room.

Always Like Me Sometimes Like Me

16. Some children think dams on rivers are bad because they hurt plants and animals.

Always Like Me Sometimes Like Me

Or

Other children think dams on rivers are good because they prevent floods.

Always Like Me Sometimes Like Me

17. Some children think outdoor lights should be turned off at night because they use electricity.

Always Like Me Sometimes Like Me

Or

Other children think outdoor lights should be left on because they keep us safer.

Always Like Me Sometimes Like Me

18. Some children are concerned about the rainforest.

Always Like Me Sometimes Like Me

Or

Other children aren't concerned about the rainforest.

Always Like Me Sometimes Like Me

19. Some children think we should build more landfills to hold our garbage.

Always Like Me Sometimes Like Me

Or

Other children think we should find other ways to deal with our garbage.

Always Like Me Sometimes Like Me

20. Some children don't worry about animals becoming extinct.

Always Like Me Sometimes Like Me

Or

Other children worry about animals becoming extinct.

Always Like Me Sometimes Like Me

21. Some children think we should use chemicals and fertilizers in our gardens.

Always Like Me Sometimes Like Me

Or

Other children think we shouldn't use chemicals or fertilizers in our gardens.

Always Like Me Sometimes Like Me

22. Some children are excited about solar energy.

Always Like Me Sometimes Like Me

Or

Other children don't worry about solar energy.

Always Like Me Sometimes Like Me

23. Some children believe people should be able to live wherever they want.

Always Like Me Sometimes Like Me

Or

Other children believe that people should be careful not to destroy animals' homes.

Always Like Me Sometimes Like Me

24. Some children worry about air pollution.

Always Like Me Sometimes Like Me
Or

Other children don't worry about air pollution.

Always Like Me Sometimes Like Me

25. Some children get their parents to drive them places they want to go.

Always Like Me Sometimes Like Me
Or

Other children ride their bikes or walk when they can.

Always Like Me Sometimes Like Me

Section II.
Knowledge

1. The plastic bags from the grocery store can be recycled, yes or no?
 - a.) yes
 - b.) no
2. Circle which item can be recycled:
 - a.) glass
 - b.) newspaper
 - c.) aluminum cans
 - d.) all of the above
3. How many years does it take a single can to decompose?
 - a.) 20-40
 - b.) 60-80
 - c.) 80-100
 - d.) 100-120
4. Which one is not considered one of the “3 R’s” of recycling?
 - a.) reduce
 - b.) redirect
 - c.) recycle
 - d.) reuse
5. How many times can glass be recycled?
 - a.) never
 - b.) once
 - c.) twenty times
 - d.) forever
6. Which does NOT save energy in our home?
 - a.) turning all appliances to stand-by when not in use
 - b.) turning off and unplugging all appliances when not in use
 - c.) turning off all lights when not in the room
 - d.) leaving lights on in only the rooms you are moving between
7. Most of the energy used on Earth today originally came from which source?
 - a.) sun
 - b.) oceans
 - c.) soil
 - d.) air

8. The average family of four uses approximately _____ gallons of water per day?
- a. 50
 - b. 100
 - c. 250
 - d. 400
9. Which uses the most energy in American homes each year?
- a. lighting
 - b. water heating
 - c. heating and cooling rooms
 - d. refrigeration
10. Today, which renewable energy source provides the U.S. with the most energy?
- a. wind
 - b. solar
 - c. geothermal
 - d. hydropower
11. What is compost?
- a. mud
 - b. dark brown soil-like material
 - c. a pizza topping
 - d. a type of plant
12. Which of these cannot be turned into compost?
- a. plastic bag
 - b. apple core
 - c. grass cuttings
 - d. potato peelings
13. When composting, it is okay to feed your worms meat or dairy products?
- a. yes
 - b. no
14. To compost you need to live out in the country, or at least in an area with plenty of yard space?
- a. true
 - b. false

15. Why should we make compost?
- a. it is bad for the environment
 - b. helps us watch TV
 - c. reduces wastes going to landfill
 - d. helps us run faster

Section III. Behaviors

Check each box that applies to you:

- Recycle glass
- Turn lights off when leaving a room
- Compost food scraps
- Use canvas bags instead of plastic grocery bags
- Recycle aluminum cans
- Use both sides of paper
- Drink out of a reusable bottle instead of a plastic water bottle
- Unplug appliances when not in use
- Take quick showers instead of baths
- Walk or ride a bike instead of riding in a car
- Recycle plastic
- Turn off water while brushing teeth
- Carpool to school or other places
- Recycle newspaper
- Use a reusable lunch bag/box instead of a brown bag/sack lunch

Section IV.
Demographics

Gender:

- Male
- Female

Community:

- Urban
- Rural
- Suburban

Have you ever been taught an environmental education program before?

- Yes
- No

Name: _____

VITA

Sarah Elizabeth Smith was born December 30, 1983 to Mike and Pamela Smith of Sumner County, Hendersonville, Tennessee. She graduated from the University of Tennessee, Knoxville with a Bachelor of Science degree in Plant Sciences in May of 2006. While an undergraduate, Sarah was involved with her sorority, Sigma Kappa, and various agricultural honor societies.

In the fall of 2007, Sarah returned to the University of Tennessee, Knoxville to pursue a Master of Science Degree in Agricultural and Extension Education. In the summer of 2008, Sarah was offered in internship with the University of Georgia Cooperative Extension Service.

Presently, she lives in Atlanta, Georgia working for The University of Georgia Cooperative Extension Service. She is a Program Coordinator specializing in youth for DeKalb County.