The impact of children's literature on the environmental awareness of a population of second grade students

Iris Jackeline Russo

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THE IMPACT OF CHILDREN'S LITERATURE ON THE ENVIRONMENTAL AWARENESS OF A POPULATION OF SECOND GRADE STUDENTS

A Project
Presented to the Faculty of California State University, San Bernardino

In Partial Fulfillment of the Requirements for the Degree Master of Arts in Education: Environmental Education

by Iris Jackeline Russo December 2008
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Approved by:

Dr. Herbert Brunnerst, First Reader

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ABSTRACT

This project aimed at helping second grade children in a major metropolitan city in the Inland Empire of Southern California gain environmental sensitivity and awareness by infusing the existing English Language Arts curriculum with environmental activities. This project also gauged the student’s before and after sensitivity through the use of a graphic organizer in which the students wrote: what I know, what I want to know and what I learned, also known as a (KWL) chart, using five different scales: awareness, knowledge, attitudes, skills, and participation. As the results showed, the pairing of the stories with related activities proved to be influential in promoting children’s sensitivity and awareness towards the environment particularly in the scales of awareness, knowledge, and attitudes. Further study may show whether these scales can be influenced by other factors such as culture, religion or educational background.
ACKNOWLEDGMENTS

This project was made possible with the contributions and support from many individuals. First and foremost I would like to thank my family for their unconditional love, sacrifice, and support. Next, I would like to thank the wind beneath my wings, Robert. You are my rock and guiding light. I would also like to thank Dr. Brunkhorst and Dr. Mary Jo Skillings for guiding my project and making it into the project it has become today. It is now something that I can be proud of and use in my lifelong journey as an advocate and educator of environmental education. I would like to thank Tim Thelander for your flexibility and Dr. Jesunathadas for all of your volunteer work. Finally, I would like to thank Dr. Stoner for teaching me how to wear both hats. You are all amazing and all of your help has really meant the world to me and helped make this project a reality. Andy, my big brother, I will always miss you. May you always watch over me, guide me and give me strength through my darkest valleys.
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Environmental education has long struggled for legitimacy alongside more traditional disciplines like mathematics and language arts. It is not a mandated part of the California curriculum, and therefore, the schools have not taken on that central role in this process (Sobel, 2004). The absence of environmental education in the curriculum has left environmental stewardship in the hands of individual classroom teachers. By doing so, the assumption is made that teachers are sensitive to environmental issues and are willing and able to incorporate it into their daily agendas. Furthermore, research suggests that most educators are not prepared to “present environmental topics to students in a manner that reflects the complexity of the issues involved” (Smith, 2005, p. 388).

Without knowledge on the environment, children are less likely to develop the sensitivity or respect for our planet that leads to proactive lifestyles towards environmental issues (Sward & Marcinkowski 2005). This emotional and physical disconnect between our youth and the environment, or as termed by Louv (2005),
nature-deficit disorder, can be linked to the lack of opportunities that children have in today's classrooms to develop their curiosity and bond with nature. According to Sobel (2004), this lack of opportunity comes from an overwhelming amount of high stake's standardized testing and a lack of relevant curriculum that connects their local environment to their classroom academics. Now, more than ever, it seems that children lack basic knowledge and awareness on environmental issues that could be key in promoting sensitivity. "Children today are more adept at naming cartoon characters than native species and overwhelmingly prefer indoor to outdoor play" (Louv, 2005, p. 10).

When children do hear about the environment it is usually injected with fear and negativity such as the dangers of air pollution, acid rain, global warming, deforestation, and water pollution, all with an exaggerated fear (Sanera & Shaw, 1996). Seldom do they hear positive, proactive ways people are involved, which can leave a lasting negative impact on our youth (Sanera & Shaw, 1996). However, infusing the mandated curriculum with environmental education can be the difference between a child developing sensitivity to nature, or nature-deficit disorder (Louv, 2005).
The purpose of this project is to demonstrate how one can infuse the state’s mandated curriculum, Houghton Mifflin, with children’s literature in order to promote environmental sensitivity and awareness. This will be accomplished through a set of specifically designed activities that can be used along with three of the children’s stories represented in the second grade language arts curriculum used in a major metropolitan city in the Inland Empire of Southern California. These activities will not only help highlight different environmental issues for children, but it will also help them to think critically about the environment, and what is needed to protect, and live in harmony with nature. As such, the activities can be used as a tool for other second grade teachers that want a curriculum based resource to help implement environmental education in their classrooms.

This project will present a review of the literature that will cover the evolution and origins of the definition of environmental education, what environmental sensitivity is and how it is fostered, and finally, why children’s literature has been found to be a good vehicle to promote and foster environmental sensitivity. Three stories from the Houghton Mifflin curriculum will be
selected and infused with environmental activities. The students will be given "KWL" charts, before and after the literature based activities to gauge their environmental sensitivity. Based on the results, the project will suggest how the project will fill the current void in the state’s mandated curriculum pertaining to environmental education and how literature can be an effective tool to help boost environmental understanding and sensitivity amongst second graders.

The limitations of this project include using a non-random sample of the author’s own second grade students. The project will focus on only three stories of the Houghton Mifflin series as opposed to all twenty-four stories. This project is limited to second grade only and the limitations may include the student’s prior knowledge on the content as well as their personal reading abilities.
CHAPTER TWO
LITERATURE REVIEW

Understanding Environmental Education

Over the years, Environmental Education has had many definitions and has often been a synonym for conservation education (Disinger, 2005). This presents a dilemma for many in the field primarily because there is no set universal agreement or descriptive parameter that guides those in environmental education (Disinger, 2005). On the other hand, “People directly involved with environmental education are neither researchers nor theoreticians, they don’t worry about the nuances of definitions” (Hungerford, 2002, p. 6). As such, classroom teachers are more concerned with what they can teach and expose their students to in the classroom as opposed to the definition of environmental education.

Environmental education uses many guises to provide a connection and understanding of a broad grouping of environmental issues, problems, views and concerns. According to research, the end goal for all of these different definitions amounts to a process that leads to enhanced critical thinking, problem solving, and effective decision making skills (Disinger, 2005). In essence,
environmental education aims to bridge the bio-physical natural environment with the human-made environment that impacts it.

The roots of environmental education, as the world knows it today, can be traced back to outdoor education, nature study, and conservation education (Disinger, 2005). Finding a definition that encompasses all of these criteria in an ever-changing world can be a difficult task to accomplish. However, in over thirty years of research, one definition that has surfaced as widely accepted is Dr. William Stapp's 1969 definition of environmental education. Published in the first issue of The Journal of Environmental Education, Dr. William Stapp and his associates (1969) wrote:

Environmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution. (Stapp et al., 1969, p. 31)

The definition posed by Stapp et al. has long been a basis for continuing discussion and expansion with others furthering the definition of environmental education.
In December of 1997 The Thessaloniki Declaration celebrated the 20th anniversary of the Tbilisi doctrine and even coined a new definition, "education for environment and sustainability" (Knapp, 2000, p. 33). This new definition according to Knapp (2000), was a strong sign that Environmental Education was slowly finding decreasing support. In order to find a true definition of Environmental Education in today's world, we must look back to the original objectives and let those guide the curriculum. It is the following, original objectives that will guide this project:

- **Awareness:** to help social groups and individuals acquire an awareness and sensitivity to the total environment and its allied problems. (The Tbilisi Declaration 2001, p. 15)

- **Knowledge:** to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of, the environment and its associated problems. (The Tbilisi Declaration 2001, p. 15)

- **Attitudes:** to help social groups and individuals acquire a set of values and feelings of concern for the environment and the motivation for actively participating in environmental
improvement and protection. (The Tbilisi Declaration 2001, p. 15)

• Skills: to help social groups and individuals acquire the skills for identifying and solving environmental problems. (The Tbilisi Declaration 2001, p. 15)

• Participation: to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems. (The Tbilisi Declaration, 2001, p. 15)

Understanding Environmental Sensitivity

Environmental sensitivity is a term that has been around since the 1970’s. Although it was not well understood then, it is slowly receiving increasing attention in the field of environmental education (Sward & Marcinkowski, 2001). Environmental sensitivity did not have a clear definition then, and, to this day, it still does not. Prior to the 1980’s the term environmental sensitivity was loosely referred to as an individual’s personal disposition toward the natural world (Sward & Marcinkowski, 2001) Various efforts have been made by researchers, experts, and professionals in the field of
environmental education to both simplify and define this broad term. Although Dr. William Stapp never defined this term, he did refer to it as the "exposure to, exploration of, appreciation of, and respect for the environment" (Sward & Marcinkowski, 2005, p. 302).

Research shows that merely teaching children about environmental issues will not help them to develop a deep environmental sensitivity that may lead to a proactive lifestyle (McEwen & Metzger, 1999). A study done by Nancy Peterson between 1980 and 1995 defines environmental sensitivity as "a set of affective attributes which resulted in an individual viewing the environment from an empathetic perspective" (Hungerford & Peterson 1982, p. 296). Sward and Marcinkowski (2005) would later use this study to reveal the most important factors that go into the development of environmental sensitivity. Through various interviews and questionnaires they found that frequent contact with natural areas, role models, and personal loss of a natural area where participants frequented were the most significant factors in developing environmental sensitivity (Tanner & Peterson, 2005). While these were the top three contributors, another strong factor in developing sensitivity was nature-oriented books (Tanner & Peterson 2005). Sward and Marcinkowski (2005)
found that out of 45 participants, nature oriented books contributed 29% to the development of environmental sensitivity.

This research suggests the importance of using children’s literature to help both develop and foster environmental sensitivity. These results help highlight what an effective tool children’s literature can be when infused with environmental education in order to promote environmental sensitivity. Furthermore, it lends itself as a tool for environmental educators and teachers to use with young children.

Using Children’s Literature

With the interest and awareness in environmental literacy growing more every day, educators and schools alike are faced with the challenge of finding reliable and effective tools to help introduce these topics to school aged children all the while keeping the state’s mandated standards in mind. Children’s literature can be a great vehicle to incorporate environmental education in the classroom (O’Brien & Stoner, 1987). Children’s literature is increasingly becoming a rich source of information for students to learn about everything from animals to energy to pollution (Sinclair, 1992).
Children’s literature can evoke interest and an appreciation that a textbook could not otherwise offer. Literature often includes student friendly terms and illustrations that can help a student achieve a higher level of understanding about our ecology and the environment (O’Brien & Stoner, 1987). Textbooks do not often go into much detail about important concepts or they can hold many inaccuracies, myths or misconceptions, Meyer (2002).

Only a handful of studies have been done to gauge the benefits of using children’s literature to promote environmental sensitivity and awareness. However, after reading hundreds of nature themed picture books, Marriot (2002), believed that using literature was a worthwhile contribution to the understanding of environmentally related concepts. Furthermore, after a yearlong study of five elementary schools, it was found that teachers who used children’s literature to promote environmental sensitivity and knowledge noticed an increase in their student’s environmental vocabulary and critical thinking skills (Christenson 2004). Wilson (1993) also believed that that children’s literature was an effective tool for implementing and promoting sensitivity and knowledge. In her guide, “Fostering a Love of Nature Index,” Wilson
provides guidelines for planning, implementing and evaluating different environmentally themed programs for younger children.

Children are naturally curious and for that reason, using children’s literature to introduce and promote environmental concepts can be very successful. Eggerton (1996), having read many environmentally themed children’s books believed that literature can be a successful vehicle to evoke environmental curiosity and help promote sensitivity among elementary aged children.

Finally, children’s literature can be a simpler lens through which children can view and explore their own feelings about the natural world around them and interpret several issues, through the eyes of other characters. Because California’s existing language arts standards already rely so heavily on the use of literature, it is ideal that environmentally infused literature be used in the classroom, not only for language arts, but because literature is so versatile, for cross curricular subjects as well. Children can achieve higher reading skills all the while gaining insight about environmental concepts.

The literature reviewed above provides a foundation for the many reasons why the use of children’s literature can be ideal in promoting and fostering environmental
sensitivity and knowledge in elementary aged students. Children’s literature can not only help ensure that our young children become a responsible and aware part of our planet, but also that as adults, they strive for outcomes that they can understand (Meyer, 2002).
CHAPTER THREE

• METHODOLOGY

The school where this project took place is located in a large metropolitan area in Southern California. It is a K-6 public school. It is a magnet school that prides itself in being a university demonstration school that partners with a local comprehensive regional university. The general population of this school is predominately Hispanic followed by Whites and African American. The school has a 66% rate of free or reduced lunch. The 2007-2008 California Star Test score for second grade English Language arts was 38% proficiency.

This project was inspired by a genuine and sincere desire to help incorporate environmental education into the mainstream second grade language arts curriculum in a way that addressed both the mandated California language arts standards as well as the original environmental objectives that aim to help children gain awareness, knowledge, attitudes, skills and participation toward their surrounding environment.

The literary sources chosen for this project are those from Houghton Mifflin's Theme 2 "Nature Walk". In this theme there are three separate stories that encourage
critical thinking about our environment and help ignite environmental sensitivity. It is in these three stories that the main focus, essence, and heart of this project lies. These stories are: Around the Pond: Who’s Been There?, by Lindsay Barrett George (1996), Henry and Mudge and the Starry Night, by Cynthia Rylant (1999), and Exploring Parks With Ranger Dockett, by Alice K. Flanagan.

These three stories were carefully selected amongst so many because they each carry an environmental theme that can help children think critically about their actions toward the environment, increase their environmental knowledge, awareness, and sensitivity as well as promote positive participation by children. It was also important that these books offered lasting impressions with a relatable background to the students. It is through this relatable background that emotional response can be built and helps elicit genuine environmental sensitivity, awareness and personal involvement.

After the careful selection of the literary sources the challenge became which environmental activities to incorporate into them. Since all of the stories held a theme of sustainability and sensitivity toward the environment, the activities had to be representative and
reflective of both themes. These activities although original, were inspired by other environmental resources that contain similar nature-inspired activities and lessons.

The first activity, "Who Polluted the River?" was meant to help build a sense of place and connection between children and the growing environment they live in. In this activity children had the opportunity to visualize the effects of urban sprawl and also see how each of them is connected to this growth. Although each activity could have been used with any of the three stories because of their common underlying theme, the author placed each story with a specific activity. This activity in particular was used with Exploring Parks With Ranger Dockett by Alice K. Flanagan. This was a perfect fit because the story focuses heavily on caring for the places in which we live and this activity reinforced those key concepts.

The next activity, "What a Delicate Web We Weave", was used along with Around the Pond: Who's Been There, by Lindsay Barrett George. In this activity children were asked to consider the story they read and critically think about all of the different animals along with their habitats. They were asked to think of all the ways the
animals and humans are connected and how we can all have a great impact upon the others quality of life both negatively or positively. Through the use of a real life web, children acted out their own web of life and saw the many influences upon other animals and even upon humans.

The final activity, “Leave no Trace”, was used along with Henry and Mudge and the Starry Night, by Cynthia Rylant. Since this was a story that focused around a camping trip and the outdoors, this activity was ideal for highlighting the ethical aspects of recreational impacts on the environment. Through this activity children actively engaged in decision-making skills that made them aware of their personal impact while in the outdoors. These included things such as disposing of waste properly, not feeding the wildlife and minimizing campfire impact.

Prior to reading the stories and conducting the activities, the children were all given “KWL” charts to help gauge what they already knew and what it was they wanted to learn more about pertaining to the environmental topics from the books. A “KWL” chart is a graphic organizer that helps students gather information as well as gauge and assess their learning. The “K” is for what they already know about the topic, “W” is for what they want to know about a specific topic and the “L” is for the
things they have learned after a topic is presented to them. KWL charts can assist teachers in activating prior knowledge on a specific topic or subject and encourage active reading, inquisition, and research. Drawing from the author’s own prior experience as a teacher, KWL charts can help teachers become more interactive in their instruction and have students become active thinkers in their own learning. It is through this metacognitive process of self-questioning that students are able to set their own purpose and motivation for reading. Because every student has their own schema of how he or she views the world, a KWL chart can be a great tool to help them express those thoughts and even set their own learning objectives for learning things of their own interests. Through these graphic organizers, the student is able to be self-aware and self-regulatory of their own thinking process. A KWL chart can also serve as a great assessment tool of what students have learned during a unit of study. That is why the author chose this as a form of assessment. Although only a handful of studies have been conducted to assess environmental sensitivity, and none have used the KWL chart, this original form of assessment proves to be an effective tool that involves the metacognition process
that children need to become aware of their own learning process and to learn how to think critically.

All of these stories were initially read together as a class and discussed in detail. They were then followed by the in-class activities mentioned above. The final step was to complete the "KWL" chart and gauge what it was the children had learned and how, if at all their sensitivity and awareness had changed. This was done on an independent level as students were encouraged to reflect back on the story and activity and write their thoughts down onto their new "KWL" chart. They were reminded that under the "K" they were to write what they already knew, under the "W" what is what they wanted to learn, and under the "L" what is was that they wanted to learn in the future.

The KWL charts were scored using a teacher-made rubric based on the guiding objectives for this project which were: awareness, knowledge, attitudes, skills, and participation. Each category was considered a scale and given a score from no noticeable changes (score = 1), some noticeable changes (score = 2), to very noticeable changes (score = 3). Students were scored pre and post KWL using the rubric on all five scales and the numerical change determined as the difference in the scores.
Table 1. Environmental Sensitivity Rubric

<table>
<thead>
<tr>
<th>Environmental Sensitivity Rubric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of scales: 5 3: Very noticeable change</td>
</tr>
<tr>
<td>Grade: 2 2: Some noticeable change</td>
</tr>
<tr>
<td>Scale length: 3 1: No noticeable change</td>
</tr>
</tbody>
</table>

**Scale 1: Awareness**

3 Clearly shows awareness of specific issues discussed both orally and in written form.
2 Somewhat demonstrated sense of awareness in both oral and written form.
1 Vaguely or incompletely showed awareness of issues discussed in any form.

**Scale 2: Knowledge**

3 Demonstrated accurate, relevant and comprehensively developed ideas about issues.
2 Demonstrated somewhat accurate and developed ideas about issues.
1 Demonstrated irrelevant or inaccurate ideas about issues.

**Scale 3: Attitudes**

3 Demonstrated positive feelings of value, concern or motivation.
2 Demonstrated some positive feelings of value, concern or motivation
1 Demonstrated no noticeable feelings or value to the environment.

**Scale 4: Skills**

3 Demonstrated ability to engage others in resolving environmental issues.
2 Demonstrated some ability to engage others in resolving environmental issues.
1 Did not actively engage others in resolving environmental issues.

**Scale 5: Participation**

3 Demonstrated ability to actively engage in the resolution of issues discussed.
2 Demonstrated some ability to actively engage in resolution of issues discussed.
1 Did not actively engage in resolution of issues discussed.
The author chose not to do a statistical test of significance because the sample size was too small and the students were not selected randomly. The author instead used the teacher-made rubric as well as the table 1 which helped determine the mean, standard deviation, and computed Cohen’s D to determine educational significance. Cohen’s D is the difference between the pre and post mean expressed in pooled standard deviation units.
CHAPTER FOUR

RESULTS

The original objective of this project was to demonstrate how one can infuse the already existing language arts curriculum with environmental activities in order to promote environmental sensitivity. The results are summarized in the table below. Whole class raw score results can be seen in appendix E.

Table 2. Descriptive Statistics and Cohen’s D for Environmental Sensitivity

<table>
<thead>
<tr>
<th>Scales</th>
<th>Pre-test N = 28</th>
<th>Post-test N = 28</th>
<th>Difference Between Mean Scores</th>
<th>Standard Deviation (pooled)</th>
<th>Cohen’s D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean Score</td>
<td>Mean Score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(SD)</td>
<td>(SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Awareness</td>
<td>1.57 (0.88)</td>
<td>2.82 (0.55)</td>
<td>1.25</td>
<td>0.73</td>
<td>1.71</td>
</tr>
<tr>
<td>Knowledge</td>
<td>1.5 (0.74)</td>
<td>2.92 (0.26)</td>
<td>1.42</td>
<td>0.55</td>
<td>2.58</td>
</tr>
<tr>
<td>Attitudes</td>
<td>2.03 (0.84)</td>
<td>2.71 (0.46)</td>
<td>0.68</td>
<td>0.67</td>
<td>1.01</td>
</tr>
<tr>
<td>Skills</td>
<td>1.0 (0)</td>
<td>1.07 (0.38)</td>
<td>0.07</td>
<td>0.27</td>
<td>0.26</td>
</tr>
<tr>
<td>Participation</td>
<td>1.0 (0)</td>
<td>1.14 (0.52)</td>
<td>0.14</td>
<td>1.07</td>
<td>0.13</td>
</tr>
</tbody>
</table>

Table 2 results show that the awareness and knowledge scales had the greatest change based on the before and after KWL charts. The significant growth was in their
awareness towards the environmental issues discussed through the children’s literature and the curriculum stories. More specifically, the two most common areas that showed significant growth were the awareness of what causes loss of habitat and the idea that our actions have an impact on the environment. Prior to the activities students showed a significant limited knowledge and awareness of the many reasons that cause habitat loss and the daily things we can do to impact or prevent harm to the environment. The difference in awareness from pre to post in Cohen’s D expressed in pooled standard units was 1.71. This means that the effect size was very large suggesting a notable educational significance. This was the second largest increase behind knowledge. The results show that 16 out of 28 students went from no noticeable changes to very noticeable changes in the awareness scale. Two out of 28 students remained with no noticeable changes and 7 remained with very noticeable changes. It is important to note that this was the only scale other than skills and participation in which any students remained with no noticeable change in their KWL. One student showed a slight increase of no noticeable changes to some noticeable change. No students decreased in any of the categories. These changes mirror Marriot’s view that
children's literature is beneficial in promoting environmental awareness. With the mean rising from 1.57 to 2.82 in the awareness scale it is crucial to point out the pattern of increase and the educational value that this method of learning can have for a student. As students completed their Pre-KWL chart they were not participating in the metacognition process. Not until after their Post KWL chart were they thinking about the things they knew and didn't know about our relationship to the environment. Not only did their awareness increase, but their understanding of how to critically think and self regulate their thinking increased as well.

Knowledge, the second scale showed the biggest growth going from a mean of 1.5 to 2.92, Cohen's D = 2.58. These scores show a large increase in both educational value and effect size. Like the awareness scale, knowledge had 16 out of 28 students showing a jump from no noticeable changes to very noticeable changes. Before the activities and the use of environmental literature, the students were not able to draw in the knowledge they already had, or their prior knowledge, mainly because it had not been activated through the use of children's literature, therefore giving them less of an advantage to use what some already knew. Six of these students grew from some
noticeable change to very noticeable changes and the four that began with high knowledge demonstrated a growth in their knowledge of environmental issues after the literature and activities. It is also important to note that there was not one student who excelled in all scales, therefore it cannot be assumed that a higher achieving student will score high on all scales or that just because they scored high on one, they will score high on all scales or that awareness equals knowledge and vice versa. Using the KWL chart was extremely important particularly in this scale because it turned some of the facts the students knew into knowledge by helping them understand the significance and legitimacy of those facts. Further study could also identify if student’s knowledge was affected by individual academic abilities and could have made this percentage growth higher.

The scale of attitudes also demonstrated growth with students displaying more motivated attitudes, feelings of concern, and a deeper value of the environment. This scale started with most of the students already displaying some positive attitudes of concern towards the environment with the pre-mean jumping from 0.46 to 0.84. A Cohen’s D of 1.01, meant a large effect size, suggesting a growth of significant educational value. Twenty out of twenty eight
students showed very noticeable changes after the post KWL chart. This scale also did not have a significant increase as the previous scales. This could be affected by cultural, religious, or educational backgrounds depending on the student’s experiences with the environment. The students showed more positive attitudes toward taking care of and improving the environment surrounding them. More specifically they showed a more concerned attitude toward the depletion of our resources and the direct link to urban sprawl. They expressed their concerns for what the future holds for them and what they might lack due to the abuse of natural resources. Further study could help identify how these positive attitudes towards the environment came about or where they originated from.

The skills scale showed little noticeable change. This scale required students to help others acquire the skills to help solve and identify environmental problems. The mean between the pre and the post changed slightly going from 1.0 to 1.07 and Cohen’s $D = 0.26$. This means that the educational value and effect size was rather small for this scale. One student out of twenty-eight was able to successfully communicate our discussed environmental issues to other individuals. These issues consisted of our urban sprawl and loss of habitat
discussions. This student also showed significant growth in all other scales and for the most part started out with a good understanding of these scales. Student number 12 is identified as gifted and talented, is an avid boy scout and has always shown an interest for the outdoors. His exposure to the outdoors began at an early age according to his parents and may very well be factor in his high scores. At this age the skills scale can be rather difficult being they are still somewhat in their preoperational to concrete operational stages of development which means that they can be a bit egocentric at times and may still be dealing with how they feel about the environment rather than how others might feel about it which is what this scale requires them to do. Further study can illustrate if the skills scale can be carried out at the second grade level.

Another scale that showed little change was participation. The mean for this scale changed slightly going from 1.0 to 1.14 and Cohen’s $D = 0.13$, the smallest out of all five scales. Only two out of twenty eight students reported participating in activities outside of the classroom that protect or improve the environment. These activities included student’s participation in litter removal and recycling. Again student number 12
showed great interest in participating in helping his environment, more particularly, his community through litter removal. The other student, student number 19 regularly says that they recycle for monetary reasons meaning that environmental sensitivity might not have played a factor in this case. This student showed high awareness and attitudes toward the environment post KWL, but did not score as high in the knowledge scale making that a possible factor for not understanding that there may be a significant monetary value as well as an environmental value in recycling. Participation can also be a tricky scale for second graders to improve upon being that this scale in particular depends largely upon their parent’s or guardian’s willingness to help or allow them to participate in. If the families do not have the transportation means or the gas money to drive their children around, then this might not necessarily mean that the intent or sensitivity was not there, but rather that the means to accomplish the task were not there.

The individual student results are summarized in the bar graph below and mirror the success and results that the few other studies done on environmental sensitivity have shown.
The implications of these results show the need and success that a curriculum infused with environmental information can have on young children. The results also show that children's literature can be a strong factor in developing environmental sensitivity as studied by Tanner and Peterson. It can nurture and encourage children's feelings of wonder about the environment around them. This was a great opportunity for children to learn about the environment in a more positive light and to perhaps shed some of the fear that can be affiliated with environmental
education. It is important that these results show the
great vehicle that children's literature can be in
promoting environmental sensitivity and awareness for all
classroom teachers. These results mirror the success that
Sward and Marcinkowski and the handful of studies used to
gauge environmental sensitivity have found in the past. It
also mirrors Christenson's yearlong study which indicated
that teachers using children's literature to promote
environmental sensitivity noticed an increase in
environmental vocabulary and critical thinking skills.

Through the eyes of other characters, children's
literature has helped children interpret the natural world
around them and has also helped evoke environmental
curiosity. This project used the versatility of children's
literature and supported the view that a state mandated
curriculum that relies so heavily on standards can be
infused with carefully selected activities to help fill
the void pertaining to environmental education and promote
environmental awareness and knowledge. Although
environmental sensitivity has never had a clear
definition, this project gave students the opportunity to
develop a more positive disposition toward the natural
world which is how Sward and Marcinkowski defined
environmental sensitivity. Furthermore, it also gave
students exposure to, exploration of, and an opportunity to appreciate the environment which is what Dr. William Stapp referred to as environmental sensitivity.

It is also important to remember the many factors that can come into play when talking about the environment and environmental sensitivity. The results above have opened up a window of questions regarding the cultural, religious and even educational background that may impact our student’s environmental sensitivity. We must remember that lack of participation or even lack of skills in motivating others may not always be directly linked to a lack of environmental sensitivity, but perhaps to other factors that can also be studied. The results have shown however, that KWL charts are an effective tool for determining environmental sensitivity and involve the student in their own metacognitive process about the environment. Furthermore, this study helped highlight that perhaps the skills and participation scales may need to be revisited or saved for upper elementary aged students due to student’s developmental stage.
As society moves into a more conscious state of awareness about our environment, and more particularly about the role and responsibility we play, it will become more and more crucial that children be given the opportunity to develop the environmental sensitivity needed to become actively involved in decisions that affect our environment. This sensitivity includes exposure, exploration and appreciation of their surroundings as stated by Sward and Marcinkowski. The quality of their awareness depends greatly on educators nurturing, fostering, encouraging and guiding children's sense of wonder about our natural world.

This project was developed as a tool for educators everywhere to help spread the sense of wonder and curiosity amongst children. It is a tool that can be used to help address the growing interest and awareness in environmental literacy as well as the challenges educators are faced with when looking for reliable and effective tools for school aged children all the while using the states mandated curriculum. It was created to help educators plant the seed of environmental awareness and
help nurture a deep respect for our complex yet fragile earth. This is a good example of how educators everywhere can stay within state mandated standards, use the mandated curriculum and still manage an interesting, educational and engaging way to reach out to children about our environmental responsibilities. While children may not have all the tools and knowledge at such an early age to stop pollution, deforestation or even loss of habitats, they can begin to acquire the building blocks they will need in their adulthood to make informed decisions and choices about their environmental impact. Those building blocks begin with exposure and opportunity such as the activities drawn from the stories presented in this project. These stories and activities represent only a few of the many activities available to educators. Many more resources are out there waiting to be utilized and like this one, make a difference in a child’s environmental sensitivity. It is also important that educators keep in mind that, as stated by Mcewen and Metzger, that merely teaching children about environmental issues will not help develop a deep sensitivity. It is activities like the ones implemented in this project that will help create and nurture a lifelong sensitivity to the environment.
Keeping in mind that environmental sensitivity does not have one uniformed definition, using the objectives that help guide environmental education as stated in the Tbilisi Declaration, awareness, knowledge, attitudes, skills and participation would be a good start for any educator. Although not all of these objectives showed noticeable changes when implemented using children's literature in this project, they are a start in the right direction. Most noticeably they helped to bring awareness, knowledge and more positive attitudes towards the environment which parallels many of the definitions of environmental sensitivity as discussed by Dr. William Stapp, Hungerford and Peterson, and Sward and Marcinkowski throughout this project.

In doing this project the author found the significant effect that infusing the state's mandated curriculum with environmental activities can have. The author would take the same steps and encourage other educators to do so as well when gauging environmental sensitivity. The only change that would be advised to other educators would be the sample population size used in the project. The author would advise using a larger population to see if the same general results can be achieved over a larger sample size and grade levels.
The author encourages anyone wishing to help build a child’s environmental sensitivity to start with a few interesting and creative books about the natural world around us. The author also challenges educators everywhere to infuse their lessons using the existing curriculum with environmental awareness using creative activities, children’s literature and even their natural surroundings. These activities just like most can be adapted to fit the needs of a variety of educators and learner needs.
APPENDIX A

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APPENDIX B

URBAN SPRAWL ACTIVITY
**Activity:** Who Polluted the River?

**Site:** Park, school yard, classroom.

**Objective/Overview:** The objective of this activity is to engage students in becoming more aware of the everyday pollution of our rivers. This activity also sheds light on the many ways the population growth affects (urban sprawl) that amount of pollution we all contribute on a daily basis, many times without being fully aware. The different elements in the material section are meant to represent different pollutants that we place in out water on a daily basis.

**Age/grade level:** 1-4 (can be adapted for lower and higher grades).

**Materials:** A large clear vase or jar filled with water, ten little clear jars, jar labels, plastic toy fish, food coloring in red, brown, soap, leaves, baking soda, dental floss, assorted litter, coffee grounds, and vegetable oil, the story "Who Polluted the River" and Exploring Parks With Ranger Dockett".

**Procedures:**
- Teacher defines the word pollution and asks students to come up with examples.
- The teacher will pick ten students to represent each image: (barnyard, trees, building sites, farmers, person fishing, family picnics, motorboats, washing the family car, drivers, and factories.) Teacher explains that when they hear their image called they are to come over and pour out their contents into the vase.
- The teacher then places vase full of water with plastic fish in middle of the room where they can all see.
- Teacher begins to read them the story and asks probing questions throughout to ask them how they feel about the river every time it's polluted a little more. Ex: Would they go swimming in this river now? What about drink from it?
- Afterwards class will discuss and chart cause and effect on board and even possible solutions to the water pollution.

**Vocabulary:** Cause and effect, pollution. (More words can be added for upper grades.)

**Educational Goals:** Students become aware of the cause and effect relationship between population growth and pollution.

**Time:** Estimated 45 minutes. 15 minutes prep time and 30 for the activity.

**Discussion Questions:**
- Who polluted the river?
- What can each of us do to keep the river clean?
- How did the population growth cause more pollution?
- Is it easier to prevent pollution, or to clean it up later?
- In the story “Exploring Parks with Ranger Dockett”, is he blaming people, or showing us all how to be a little more responsible?
APPENDIX C

LOSS OF HABITAT ACTIVITY
Activity: What a Delicate Web We Weave

Site: Park, school yard, classroom.

Lesson summary: Plants and animals are interdependent – they require each other to survive. This activity has students examine how organisms in a local ecosystem affect, and are affected, by each other through the creation of a make shift ecosystem.

Learning Objective: Students will mimic components in an ecosystem and recognize that even small changes can have widespread effects.

Age/grade level: 1-4 (can be adapted for lower and higher grades).

Duration: About 30 minutes

Activity Background/Overview: The students will be able to see visually and learn about different ecosystems and how different animals and insects influence the web of life. By watching certain insects die and the web of yarn fall apart, the students will realize what happens to these animals when they encounter environmental changes that cause them to adapt, become ill or die off. A small talk prior would be o.k., however, a little has to be left to their imagination to intrigue them for the game.

Materials: Yarn, cards with eco changing events, nametags.

Procedure:
- Make enough nametags for each student in the class. Nametags should include types of plants (i.e., pine tree, wild rose shrub, moss), animals (i.e., grizzly bear, weasel, snowshoe hare, deer mouse), insects (i.e., ant, beetle, spider), and other ecosystem components (i.e., water, rock, rotting log).
- Have students stand in a circle after reading “Around the Pond: Who’s Been There”.
- Pick one student to start off holding a ball of yarn. Holding the loose end of the yarn, have the student toss the yarn to another student. The student that they throw the yarn to should have a nametag that represents something that the first student is dependant on for survival or that depends on them for survival.
- Continue with this until all students are joined. This represents the web of life in that ecosystem and shows how living and non-living things are interdependent.
- To represent how changes to the environment can impact an ecosystem, introduce an event. Examples:
  - Mountain pine beetles have infested a forest - this kills off the pine trees. (pine tree drops the yarn)
  - Illegal poaching of bears is a problem in this ecosystem and the grizzly bear has been eliminated. (grizzly bear drops the yarn)
  - There has been an oil spill that has affected the local lake. (the water drops the yarn)
- Once the first person drops the yarn, anyone who was connected to that person needs to drop his or her yarn. This continues until all students have
dropped their yarn. This will illustrate that an ecosystem is very sensitive and changing one aspect of the ecosystem can have widespread effects.

**Evaluation/Discussion:** After the activity teacher should probe students about the relationship or link that can be made between an ecosystem and our human environment. In cooperative groups students form their ideas about how everything in our daily lives, communities, water, plants etc. are all interconnected. They will be encouraged to create and label an ecosystem illustration that depicts the ecosystem in our local community.

**Suggested pre-activity:** To help gauge prior knowledge as well as build background knowledge, it is suggested that the students develop some kind of knowledge about the food chain and the “circle of life” per se. If they are to actually create this make shift ecosystem, they will have to know what plants and animals depend on in order to thrive.

The students can help make an ecosystem with a hanger, string and drawings of different components found in an ecosystem. They will hang them and talk about the interconnectedness and importance of each component.

**Optional Post-activity:** After learning more about the web of life, students can create their own web of life on paper. To make it more relevant to them, they can even do one for the insects, animals, etc. found locally in their own communities.
APPENDIX D

LEAVE NO TRACE ACTIVITY
Activity: Leave no Trace

Site: Park, school yard, classroom.

Activity Background/Overview: Students come up with a variety of scenarios after reading "Henry and Mudge and the Starry Night" of things that humans can do to harm or interfere with wildlife and the environment. These are then written on an index card and shuffled. Each team will take turns choosing a card and acting out the scenario. Then the class will discuss why it is harmful to wildlife and or the environment and more importantly, what could have been done to prevent it.

Learning Objective: Students become familiar with inappropriate human actions that can be harmful to or interfere with wildlife and the environment.

Age/grade level: K-4 (can be adapted for lower and higher grades).

Duration: About 30-40 minutes

Materials: None. Divide students into teams.

Procedure:

- Teacher and students choral read "Henry and Mudge and the Starry Night".
- Students then discuss and chart different examples of human interference with wildlife or the environment.
- Once they all have a pretty good idea, they should each write a scenario down such as: littering, feeding the animals, carving in trees, driving vehicles over fragile environments, illegal hunting (poaching), polluting water ways, removing plants, destroying nests, etc.
- After the students have written something down, they will be divided into groups. These groups will then choose a card from the pile and act out the actions with their teams.
- After each group performs, a class discussion should be encouraged regarding if it was wrong, why, and what could have been done differently.

Evaluation/Discussion: After the activity the class should discuss what they consider wildlife and why, and they should be reminded that even the smallest things like spiders are considered wildlife and all play a vital role in our environment. Other things can also be discussed such as the positive things that humans can do for the environment and wildlife and the positive things they can do in their everyday lives.
APPENDIX E

WHOLE CLASS DESCRIPTIVE STATISTICS AND COHEN'S D

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