Environmental Health Knowledge, Attitudes and Practices of Students in Grades Four through Eight

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Abstract

The purpose of this study was to investigate environmental health knowledge, attitudes and practices of children enrolled in grades four through eight at a university laboratory school in southeast Louisiana, U.S.A. Quantitative and qualitative questions were completed through an online survey. The children's written responses to the survey questions revealed varying degrees of knowledge, attitudes and practices concerning various environmental health issues. Significant differences were found by students' gender and grade level. The qualitative analyses were consistent with and provided support for the quantitative findings. Suggestions for future research are provided.

Key words: children, conservation practices, recycling, pollution

During the past three decades, concern for the global environment has increasingly attracted the attention of individuals, communities, governments, scientists, conservation groups, industry, and the media. Considerable focus has been directed toward making people and organizations more aware of how their environmental behaviors and practices may create, contribute to, or worsen ecological problems, which in turn may pose a threat to the quality of life on our planet (Gore, 1993; Makki, Abd-El-Khalick & Boujaoude, 2003). Significant action has also been directed toward educating the public so that individuals may become more sensitive to beneficial environmental practices including conserving natural resources and preserving ecologically important natural resource areas (e.g., coastal wetlands) (Sivek, 2002).

Considering the potential long term consequences of environmental abuse on the future quality of life worldwide, it is not surprising that research studies in the past 15 years have focused on the environmental knowledge, attitudes and behaviors of college students (McMillan, 2003; Thapa, 1999). Other studies have focused on these issues with school-age children (Blanchet-Cohen, 2008; Bonnett & Williams, 1998; Kuhlemeier, van den Bergh & Lagerweij, 1999; Lo, 2010; Loughland, Reid, Walker, & Petocz, 2003; Makki et al., 2003; Palmer & Suggate, 1996; Said, Yahaya & Ahmadun, 2007; Sivek, 2002; Tuncer, Ertepinar, Tekkaya & Sungar, 2005; Van Petegem & Blieck, 2006; Witt & Kimple, 2008). Such investigations are critical since children and youth will be most significantly impacted by today's environmental practices and behaviors.

Interest in research dealing with environmental knowledge, attitudes and practices of children and youth is evidenced by the number and diversity of countries that have been the primary residences of subjects who participated in these studies. These countries included Australia (Loughland et al., 2003), Belgium and Zimbabwe (Van Petegem & Blieck, 2006), Canada (McMilian, 2003; Blanchet-Cohen, 2008); China (Lo, 2010), Lebanon (Makki et al., 2003), Malaysia (Said et al., 2007), Netherlands (Kuhlemeier et al., 1999), Nigeria (Ebong, 1994), Norway (Sorgaard & Lyngstad, 1994), Turkey (Tuncer et al., 2005), United Kingdom (Bonnett & Williams, 1998; Palmer & Suggate, 1996) and the United States of America (Gambro & Switzky, 1999; Sivek, 2002; Thapa, 1999; Witt & Kimple, 2008). These studies reported findings from interviews and/or surveys of male and female students enrolled in a variety of public and private institutions, with most subjects enrolled in secondary schools or colleges and universities. The number of completed published investigations focusing on environmental knowledge, attitudes and behaviors of elementary school children is limited (Blanchet-Cohen, 2008; Lo, 2010; Loughland et al., 2003; Tuncer et al., 2005; Sorgaard & Lyngstad, 1994; Witt & Kimple, 2008).

Typically, subjects in past research were required to respond to rating scales. These consisted of closed-ended statements or questions related to the environment that were later analyzed quantitatively, or students responded to open-ended statements which were analyzed qualitatively. Few studies exist which combine quantitative and qualitative analyses of both closed-ended and open-ended written responses of elementary school children dealing with their environmental knowledge, attitudes and practices.

This investigation was designed to address some of the limitations of past research. It examined the environmental health knowledge, attitudes and practices of children enrolled in grades four through eight at a southeast Louisiana university laboratory school, a public school located on campus. Both closed and open-ended questions related to a diverse range of global environmental topics.

Methods

The study was reviewed and approved by the University's Institutional Review Board. Parental consent forms were required for student participation. Prior to the administration of the survey, each student completed an assent form, agreeing to participate in the study.

Students completed the online survey in the school's computer lab during their regularly scheduled computer time. As part of the administration protocol, students were informed of the purpose of the study, were allowed to ask questions and were instructed as to how they could exit the survey at any time. Students were reminded to read each question carefully and to raise their hands if they had questions. Then, students independently completed both the quantitative and qualitative questions. The length of time for survey completion ranged from 10-15 minutes, with fourth graders requiring more time than older students.

Instrument Development

In the year prior to the full study, researchers conducted focus groups with 24 eighth graders. These students were selected for the focus groups since they were expected to graduate from the

laboratory school and therefore would not be among the group surveyed in the following year. Based on readings of current literature, the researchers developed seven qualitative questions about the environment. Examples included: "Can the environment affect our health? If so, how?"; "What concerns you about the environment?" and "What do you think about when you hear the words, *environmental health*?"

The researchers compiled the responses to the seven qualitative questions, studied these comments, and constructed a draft version of the online survey using the web-based survey builder, SurveyMonkey.com. Pilot tests were performed with fourth graders in the University's Summer Camp Program to determine readability, comprehension and completion time. Revisions were made to the survey based on students' comments. Fourth and fifth grade teachers in local public schools also provided suggestions for changes and additions. A final instrument was constructed incorporating their recommendations.

Using a mixed methods research design, the current study considered both quantitative and qualitative responses. Both study aspects were given the same priority and weight in both the data collection phase as well as the analysis phase. Quantitative questions solicited demographic information as well as knowledge, attitudes and practices concerning the environment. The questions about environmental practices were related to behaviors at school, in the home and in the community. Students were also given the opportunity to type in answers to three qualitative questions concerning the environment. See Table 1 for examples of closed and open-ended questions.

Table 1. ***Sample Survey Questions***

Knowledge questions			
Littering is against the law.	yes	no	I don't know
Pollution damages the earth and the air around it .	yes	no	I don't know
Mold in the environment can make a person sick.	yes	no	I don't know
Behavior/attitude questions			
If I see paper or wrappers on the ground at school, I put them in the trash can.	yes	no	sometimes
I litter.	yes	no	sometimes
I turn off the lights when I leave a room.	yes	no	sometimes
Open-ended questions			
What worries you about the environment?			
What can you do to help or protect the environment?			

Statistical Analyses

Quantitative analyses were conducted using SPSS version 16. Frequency counts and percentages of student responses were compiled and analyzed across gender and grade level groupings. Chi-square statistics were conducted to determine if there were significant differences by gender in selected individual questions assessing knowledge, attitudes and practices. In addition, responses of students in grades 4, 5 and 6 (elementary school) were compared to students in grades 7 and 8 (junior high school).

Qualitative analyses were conducted in an attempt to capture the essence of the open-ended responses and analyzed through the use of coding. The process of coding began with organizing all of the students' responses by placing them into a database. From there, researchers collectively observed the students' responses for each question. Through the process of observing, the researchers discovered patterns of regularities in the data, and in turn, identified and labeled text segments. For example, many respondents indicated "littering" to be something that worries them about the environment. A text segment was defined whenever a word or phrase was used related to littering, such as "throwing trash." Through the process of identifying and labeling the text segments, the researchers were able to examine the data for "overlap and redundancy" (Creswell, 2005, p. 589). In turn, this enabled researchers to collapse the text segments into themes. Themes were developed for each of the survey questions relating to the respondents' concerns about the environment, what makes them happy about the environment, and what they can do to help or protect the environment.

Trustworthiness of the Study

In an effort to ensure the accuracy of the qualitative analyses, the researchers validated the findings through the process of triangulation of data sources. "Triangulation is the process of corroborating evidence from different individuals, types of data, or methods of data collection in descriptions and themes in qualitative research" (Creswell, 2005, p. 252). Through the process of triangulation, the researcher considers the coalescence of three essential data sources. In this study, the process was accomplished through (1) the survey responses themselves, (2) the researchers' notes, and (3) the corroboration of quantitative and qualitative findings. It should also be noted that two researchers examined the qualitative data separately and found the same results.

Participants

Over 100 students participated in the study with a response rate of 92%. Over half of the participants were male and two-thirds were white. Note demographics in Table 2.

Table 2. ***Demographic Information***

Demographic Information	**N**	**%**
All grades	115	92
Gender		
Females	53	45
Males	62	55
Race/Ethnicity		
Black/African American	20.0	17.4
White	79	68.7
Multiracial	4	3.5
Hispanic	4	3.5
Asian	4	3.5
Other	4	3.5
Grade Level		
Fourth	19	16.5
Fifth	25	21.7
Sixth	24	20.9
Seventh	24	20.9
Eighth	23	20

Quantitative Results

Knowledge of and Practices Related to the Environment and Recycling

Students were asked their perceptions of what is considered their environment. Forty-three percent of the students (n = 49) thought that school was part of their environment; 68% (n = 78) had discussed the environment in their classes. Most students indicated that certain environmental conditions could impact health. See Table 3.

Table 3. ***Impact of the Environment on Health***

	Yes	No	I don't know
The environment can make me sick.	58.3% (67)	13.9% (16)	27.8% (32)
Cigarette smoke in the environment can make people sick.	93% (107)	2.6% (3)	4.3% (5)
Mold in the environment can make a person sick.	77.4% (89)	2.6% (3)	20% (23)

About one third of the students (36%, n = 41) said the school recycled and that they had visited a recycling center to drop off items. Twenty-two percent (n = 25) indicated that their families recycled. The top three items recycled by their families were newspapers (52%), cans (45%) and plastics and other paper (38%). Items that were less likely to be recycled were chemicals, paint, computers, light bulbs and oil.

Conservation and Littering

Almost all students (97%, n = 111) indicated that they believed people could hurt the environment by their behaviors and practices. In addition, students reported participating in conservation practices as summarized in Table 4. Seventy-nine percent of the students (n = 91) normally showered but only 12% (n = 14) reported turning the shower on and off to conserve water. Of the 21% (n = 24) that took baths, 71% (n = 17) stated that they did not fill the tub to the top. Further, 70% (n = 81) turned the water off while brushing their teeth.

Table 4. ***Conservation Practices***

Which do you turn off at night?	%	n
Computers	50%	57
Games	72%	83
Television	72%	83
Lights	90%	104

While 74% of the students (n = 85) knew that it is against the law to litter and 97% (n = 111) expressed that they liked to keep their environment clean, 31% (n = 36) still stated that they littered sometimes. However, 37% (n = 43) of the students reported picking up paper or wrappers at school and putting them in the trash can and 34% (n = 39) had told friends not to litter. With regard to littering behaviors in the community, a majority of the students (78%, n = 90) did not litter waterways, throw litter out of the car (62%, n = 71) or drop litter on the ground while attending parades and festivals (80%, n = 92).

Concerns About and Ways to Improve the Environment

Most of the students (88%, n = 101) said they did think about the environment. They were more likely to reflect about the air, trees, rivers and nature and less likely to think about hurricanes, germs and chemicals in the environment. Almost all students (97%, n = 112) stated that they liked to be outside and to breathe fresh air (99%, n = 114).

Slightly over half of the students (52%, n = 60) expressed concern about global warming. Fifty percent (n = 57) knew that Louisiana loses land along its coastline every year. Almost all students (90%, n = 104) agreed that pollution damages the earth and the air around it. Students indicated a number of ways to help the environment as noted in Table 5.

Table 5. ***Ways to Help the Environment***

	%	n
Picking up trash	94%	108
Planting trees	89%	102
Smoke free restaurants	76%	87
Sun/wind power	76%	87
Hybrid cars	53%	61
Stop use of pesticides	52%	60
Compost piles	44%	50

Differences by Grade Level and Gender

Significant differences were found in knowledge between junior high school and elementary school students. While junior high school students exhibited more knowledge of the environment, elementary school students were more likely to engage in healthful environmental practices as shown in Table 6. Chi-square analyses also revealed significant differences by gender as presented in Table 7.

Table 6. ***Differences in Knowledge and Practices by Grade Level***

	Elementary	Junior High	X2	df	P value
Knowledge					
Mold can make you sick.	68%	92%	9.3	2	.009
People can hurt the environment.	100%	92%	6.0	1	.026
Every year, Louisiana loses land along its coastline.	40%	65%	7.2	2	.028
Practices					
Pick up litter	47%	23%	10.5	2	.005
Turn water off when brushing teeth	78%	60%	4.5	1	.028
Don't litter waterways	88%	65%	10.9	2	.004
Tell friends not to litter	44%	20%	7.6	2	.021

Table 7. ***Differences in Knowledge and Practices by Gender***

	Females	Males	X2	df	P value
Knowledge					
Every year, Louisiana loses land along its coastline.	61%	38%	6.7	2	.028
Practices					
Turn water off when brushing teeth	81%	61%	5.4	1	.028
Don't litter waterways	4%	23%	8.7	2	.004

Qualitative Results

Overall Themes

Qualitative results evolved from three open-ended questions that were asked in the survey questionnaire: "What worries you about the environment?"; "What makes you happy about the environment?" and "What can you do to help (or protect) the environment?" The process of coding was used to collapse the students' responses into six themes and ten sub-themes, using their actual phrases. The following is a presentation of themes for each of the three questions set forth by the researchers.

What makes me worry about the environment? When the students were asked to reflect on what "worries" them about the environment, two themes and three sub-themes emerged. The first theme, "Pollution" reflected the concern of littering and was a common response among the students who completed the questionnaire. Through this sentiment, it was seen that the students were concerned about the amount of trash on the ground and frustrated by seeing people litter and/or not picking up trash off of the ground. A sub-theme that emerged from this theme was that of "people who smoke." Many students indicated their dismay over people who smoke and recognized that throwing cigarette butts on the ground or throwing them out of a car window is littering. A second sub-theme of "Pollution" was "we could hurt the animals." This emerged as the students recognized that dirty air and water can adversely affect the health of animals. This was seen through common quotations of "animals can die," "people litter in rivers," "making animals endangered," and "things we dispose of will harm or kill animals."

"Global warming" was a second emerging theme that expressed the students' concerns over the threat of global warming. From this, a sub-theme of "what will the world be like when I grow up?" emerged as many of the students saw global warming as a threat to the future. This was seen through many quotations such as, "I'm afraid for the next generation of kids," "global warming worries me," "my little brother will not have a good world to live [in]," and "what worries me the most is global warming."

When the students reflected on the aspects that worry them about the environment, girls were seen to express stronger concerns pertaining to littering, harm to animals, and smoking than their male counterparts. Junior high school girls, in particular, indicated concerns of water-related issues such as pollution and shortages, and individuals' lack of concern about the environment. More elementary school males expressed alarm about global warming than did females.

What makes me happy about the environment? When students were asked about what made them happy about the environment, students indicated three themes that brought contentment : "Things in nature," "No pollution," and "Recreation." Under the theme of "Things in nature," two sub-themes of "the trees and flowers" and "the animals" emerged. Common quotations that represented the essence of this theme and sub-themes were "the animals that help get us food [products]," "when the birds and other animals have a place to stay without having to worry about their houses being destroyed," and "the beautiful flowers and trees." Interestingly, almost three times as many junior high school females as males indicated that nature, especially trees and plants, gave them pleasure. Also, the theme of "No pollution" represented how pleased the students were with a clean environment. The sub-theme of "seeing people recycle," emerged under this theme and expressed how important the students regarded recycling.

Students also mentioned that outdoor environments for activity and play were important to their happiness. This contributed to the emergence of the third theme of "Recreation" and sub-theme of "a place where I can play." Common quotations that represented this theme/sub-theme included, "I like to go mountain hiking, swimming, canoeing, camping, biking," "having lots of time to play," and "going someplace where it's just you and nature – like some mountains."

Males and females at the elementary school level expressed the need to help the environment, such as reducing the amount of trash and litter. However junior high school males provided scant responses when reflecting on what makes them happy about the environment. While reducing trash and litter was seemingly important to elementary school students, most junior high school males did not share the same concern.

What can I do to help the environment? One major theme emerged from the third open-ended question that allowed students to suggest ways to help the environment. The theme "Stop Pollution" surfaced with three sub-themes of "I can pick up trash," "recycle more," and "stop the cigarettes!" When students reflected on ways they could help, the general consensus among them was that of stopping pollution. This was seen in various forms, ranging from picking up trash to conserving energy. Sample quotations that captured the essence of this theme were, "pick up stray trash you see…recycle, and use hybrid cars," "you can conserve energy, use renewable energy sources when possible, recycle, and keep your community free from littering," "stop littering…[don't use] diesel cars, and stop using pesticides!" and "…turn the water off when you're not using it."

"Stop the cigarettes!" was a sub-theme that developed under the umbrella of "Stop Pollution"; these students viewed smoking as a form of pollution. Quotations that illustrate this include, "…just don't smoke," and "If things are happening now [such as] smoking…the earth will turn into probably a very unpleasant place to be." Of important note, all students, except junior high school males, mentioned that eliminating smoking would promote a healthier environment.

In addition, some students expressed ideas concerning advocacy and conservation of resources. Females in both the elementary and junior high schools were more likely than males to support advocacy in solving environmental issues. Moreover, about one in ten students expressed the need to conserve resources through means such as carpooling, and turning off lights and appliances.

Discussion and Implications

In the current study, the children's written responses to closed-ended questions revealed varying degrees of knowledge, attitudes and practices concerning environmental health issues. For example, about 60% of the students indicated through quantitative responses that the environment could have a negative impact on health and acknowledged the effects of mold and second-hand smoke on individuals' health. Only about half of the students in our study were aware of global warming. Since the university laboratory school is located in southeastern Louisiana, students

were cognizant of environmental issues paramount in this area, such as pollution, hurricanes and coastal erosion. However, this study was conducted before the Gulf of Mexico Oil Spill on April 20, 2010. Since this oil spill, students in this school as well as others in Louisiana may have become more aware of how the petroleum and chemical industries can impact the environment affecting the ecology, health, culture and economics of a region. Thus, the same study repeated might produce different results.

This study supports other research that reported differences in knowledge, attitudes and practices by students' grade levels. In studying 69 Norwegian children and adolescents, ages 8 and 14, Sorgaard and Lyngstad (1994) found more abstract thinking among older students, characterized by a greater awareness of the connection among environmental issues, consumerism and industrial greed. In the quantitative aspect of the current study, more junior high school students than elementary school students were aware of the threat of coastal erosion in Louisiana and the impact of mold on health. Older students may have learned more about these environmental topics in their science or health education classes. However, elementary school students were more likely than male junior high school students to engage in positive environmental practices, like using less water when brushing their teeth and not littering. Similarly, Loughland et al. (2003) noted that primary students were more inclined to show respect and care for the environment than did high school students.

Other investigations have found differences in knowledge, attitudes and practices by gender. Loughland et al. (2003) revealed that females, ages 9-17, were 1.5 times more likely to have a "relation" conception in which they perceived that "the environment contributes to their well being as they contribute to the environment's well being"; they were more likely to care for the environment than males of the same age. Tuncer et al. (2005) conducted a study of Turkish students in sixth, seventh, eighth and tenth grades (mean age=13.5) concerning environmental problems, solutions and individual responsibilities. They found that females exhibited more positive attitudes toward the environment and were more aware of individual responsibilities and overall environmental problems than did boys. Quantitative findings in our study revealed that males were more cognizant of coastal erosion and global warming issues than females. Moreover, it was found that more elementary school males than females were alarmed by global warming. However, females were more likely than males to exhibit positive environmental behaviors such as conserving water, for example, while brushing their teeth. Qualitative themes in our study supported these findings. For example, females as compared to males exhibited more favorable attitudes toward the environment and derived greater pleasure from things in nature, such as trees. Females in our study also were found to be more cognizant of environmental issues and supportive of environmental advocacy than their male counterparts.

Makki et al. (2003) found that a parent's level of education affected students' knowledge and comprehension of the environment. Although this present investigation did not directly address this, we did ask questions regarding recycling practices at home. While our students had knowledge of recycling, less than a quarter of them recycled with their families on a regular basis. However, the theme of "Stop Pollution" was observed in the study where students expressed a strong belief in the need to recycle. Providing lessons in environmental education could increase recycling efforts by families, schools and communities, while promoting conservation of resources.

Bonnett and Williams (1998) suggested that environmental education should be an integral part of the curriculum, allowing students to have the opportunity to express their views and to apply information learned. Witt and Kimple (2008) found that an ideal time to teach lessons about the environment is in preschool. When students learn information at this time, it may remain with them through their school days and into adulthood. However, students in all grade levels should be formally educated about the environment and its impact on health (Lo, 2010). Blanchet-Cohen (2008) stressed the importance of students having direct contact with nature and the need for adult mentoring. In another study by Lo (2010), students engaged in nature experiences in order to develop an appreciation for the environment. In the current study, although students expressed some environmental health knowledge and exhibited positive practices, participation in more formal environmental education lessons could be beneficial. Through this education, students could discuss the impact of the environment on health and engage in interactive activities such as recycling and clean up days. Parents could participate in interactive lessons through school newsletters and special program nights, offering opportunities for collaboration with their children.

The current study through the use of a mixed-design method provided insight into the environmental health knowledge, attitudes and practices of elementary and junior high school students at a university laboratory school. Additional research could focus on assisting classroom teachers in integrating environmental education into their daily lessons and measuring learner outcomes. Also, it may be interesting to follow students from preschool to college to determine which factors predict positive environmental practices. In light of recent global environmental issues, including the Gulf Oil Spill, continued research and education are critical in promoting knowledge about sustainability practices among youth and instilling in them respect for the earth and its environment.

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