Developing the Next Generation of Conservation Leaders: Promoting Environmentally Responsible Behavior through the Student Climate and Conservation Congress

A THESIS
SUBMITTED TO THE FACULTY OF
UNIVERSITY OF MINNESOTA
BY

Nathaniel Blood

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
MASTER OF ENVIRONMENTAL EDUCATION

Dr. Julie Ernst
Dr. Thomas Beery
Nathan Meyer

May 2014

UNIVERSITY OF MINNESOTA

This is to certify that I have examined this copy of a master's thesis

Nathaniel Blood

and have found that it is complete and satisfactory in all respects,
and that any and all revisions required by the final
examining committee have been made.

Julie Ernst

Name of Faculty Adviser

[redacted]

Signature of Faculty Adviser

5-23-14

Date

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Acknowledgements

I would first like to acknowledge my family for supporting in every way my journey through this program. I would also like to acknowledge my committee for providing much-needed help and guidance through all aspects of this project. I also would like to note my sincere thanks for the opportunity to work with staff at the National Conservation Training Center and at the Green School Alliance, as well as for their time and assistance. Finally, I would like to thank Heidi Wainer for getting me started and inspiring me to continue in this wonderful field.

Abstract

This project examined the Student Climate and Conservation Congress (SC3), a joint educational effort between the United States Fish and Wildlife Service and the Green Schools Alliance. It examined the effect of SC3 on variables identified in the literature as influencing environmentally responsible behavior. These variables included perceived environmental knowledge, perceived knowledge of citizen participation and action strategies, perceived action skills, environmental attitudes, locus of control, personal responsibility, and intention to act. Furthermore, it explored whether or not these variables could be used to predict environmental action and continued commitment to conservation action. Perceived environmental knowledge, perceived knowledge of citizen participation and action strategies, perceived action skills, environmental attitudes, locus of control, and personal responsibility increased after participation in the program. Locus of control was found to significantly predict intention to act. None of the variables could be used to predict environmental action or continued commitment to conservation action. However pretest levels of environmental attitudes were significantly related to environmental action, and pretest levels of environmental attitudes and pretest levels of personal responsibility were significantly related to continued commitment to conservation action. In this study, intention for action was not related to action, nor was action related to continued commitment toward environmental action. Program implications and suggestions for future research were generated out of this study‟s findings.

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Chapter 1

INTRODUCTION

Background

Over the past few decades, climate change, conservation science, and their related impacts on society have become topics of primary importance nationally and internationally. The U.S. Fish and Wildlife Service notes, "Today we face some of the most complex conservation challenges. Our climate is changing, interest in the natural world is dwindling, and the resources we have relied upon to maintain our society are quickly vanishing" (2012, p. 3). These challenges are complex and integrate a wide variety of disciplines. Multiple agencies and organizations have worked to address these problems at the foundational level of education. More specifically, education efforts to develop a new generation of conservation leaders have recently risen to prominence. These leaders will need not only motivation to act responsibly in the context of environmental issues, but also the knowledge, attitudes, and skills necessary for solving conservation problems in their home communities.

The U.S. Fish and Wildlife Service is an agency within the Department of the Interior with the mission of "…working with others, to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people" (U.S. Fish and Wildlife Service, n.d.). It is currently working to meet the goals of the Department of the Interior"s *Youth in the Great Outdoors* initiative, a multi-agency effort to develop the next generation of conservation and community leaders.

Another organization implementing education efforts to promote conservation and sustainability is the Green Schools Alliance, or GSA. The GSA‟s mission is, “is to connect and empower K-12 schools to lead the transformation to global environmental sustainability” (Green Schools Alliance, n.d., paragraph 1). In order to meet the efforts of the *Youth in the Great Outdoors* initiative, the U.S. Fish and Wildlife Service has partnered with GSA to develop the *Student Climate and Conservation Congress* program, or SC3. The mission of SC3 is to “…empower outstanding student environmental leaders with the skills, knowledge, and tools necessary to address natural resource conservation challenges and better serve their schools and communities” (U.S. Fish and Wildlife Service, 2012, p. 5). After the week-long program, students return home with a plan to implement conservation projects that will benefit their communities. Thus, SC3 encourages students to act in an environmentally responsible ways, particularly through the implementation of conservation projects in their home communities. The SC3 program objectives for student participants are as follows:

1. Develop an enhanced understanding of conservation science, climate change, the political environment, the power of place, and economic issues and conditions that will contribute to the future in which they will be asked to lead;
2. Gain knowledge and understanding while working with adult mentors and conservations leaders of green design, conservation practices, green careers, and the role of the arts in conservation;

3. Build skills related to leading green campus design and operation and develop a personal implementation plan that inspires action and addresses conservation challenges upon return to their schools/communities;

4. Graft a "green" vision that can guide their actions and choices as the next generation of conservation leaders; and

5. Become part of a network of student conservation leaders who will serve their school and communities (U.S. Fish and Wildlife Service, 2012, p.5).

See Figure 1 for a logic model that describes program activities and outcomes.

However, although the SC3 program has been conducted for several years now, there is a lack of research on the effect of SC3 on students" intentions to act in an environmentally responsible manner and on their intentions to continue participating in conservation activities in the future. Furthermore, there has been no formal evaluation of how successfully students have completed conservation projects in their communities.

Thus, the purpose of this study was to provide the SC3 partners with information regarding their program"s effectiveness in fostering attributes necessary for environmentally responsible behavior, as well as to study the predictive ability of these attributes toward environmental action. This study used a quantitative, single-group interrupted time-series design to answer the associated research questions. Hwang, Kim, and Jeng (2000) have identified four major variables that interact to determine an individual"s intent to act in an environmentally responsible way: environmental knowledge, environmental attitudes, locus of control, and a sense of personal responsibility. The Hines, Hungerford, and Tomera (1986/87) model identifies

knowledge of environmental issues, action skills, action strategies, environmental attitudes, locus of control, and personal responsibility as factors leading to intention to act. Thus, these models and their accompanying variables and definitions were used to provide a theoretical framework for the study.

Research Questions

1. What is the effect of participation in SC3 on students‟ perceived environmental knowledge, perceived knowledge of citizen participation and action strategies, perceived action skills, environmental attitudes, locus of control, and personal responsibility?
2. Which of the following variables significantly predicts intention to act: perceived environmental knowledge, perceived knowledge of citizen participation and action strategies, perceived action skills, environmental attitudes, locus of control, and personal responsibility?
3. Which of the following variables significantly predicts environmental action: perceived environmental knowledge, perceived knowledge of citizen participation and action strategies, perceived action skills, environmental attitudes, locus of control, personal responsibility, and intention to act?
4. Which of the following variables significantly predicts continued commitment toward conservation action: perceived environmental knowledge, perceived knowledge of citizen participation and action strategies, perceived action skills, environmental attitudes, locus of control, personal responsibility, and previous environmental action?

Definition of Terms

Environmental Knowledge

Environmental knowledge is defined as knowledge specifically relating to "…the environment and its related problems" (UNESCO, 1978, p. 27). This construct was operationalized as SC3 participants‟ perceived knowledge of conservation and climate related issues facing their community and their understanding of the interrelationships among human society, economics, and the natural environment.

Knowledge of Citizen Participation and Action Strategies

This construct was defined in the North American Association for Environmental Education‟s (NAAEE) *Framework for Assessing Environmental Literacy* as knowledge regarding what students and citizens can do, alone or in groups, to solve problems and resolve issues (Hollweg et al., 2011). This construct was operationalized as SC3 participants‟ perceived knowledge of strategies and paths towards environmental action that they can take either individually or in a group.

Action Skills

This construct was defined as skills and abilities that can be called upon in the real world for a specific purpose (Hollweg et al., 2011). Based on the definition in NAAEE‟s *Framework for Assessing Environmental Literacy*, this construct was operationalized as SC3 participants‟ perceived issue investigation and evaluation skills, as well as their leadership, organizational, and decision making skills that can be used to address environmental issues in their communities.

Environmental Attitudes

This construct was defined as a combination of positive feelings and concern towards the environment and motivation towards working for its improvement (UNESCO, 1978). Specifically, environmental attitudes are the collection of beliefs, affect, and behavioral intentions a person holds regarding environmentally related activities or issues (Schultz, Shriver, Tabanico, & Khazian, 2004) as compared to environmental concern, or a general environmental attitude (Bamberg, 2003). In this study, environmental attitudes were operationalized through an adapted version of the Environmental Attitudes Inventory (Milfont & Duckitt, 2010).

Personal Responsibility

This construct was defined as a sense of obligation or duty to behave in a specific way in combination with a feeling of personal investment in the issue (Hwang, Kim, & Jeng, 2000). The NAAEE *Framework for Assessing Environmental Literacy* further defines it as "personal commitment to environmentally corrective behaviors" (Borden, 1984, p. 14 in Hollweg et al., 2011). Personal responsibility was operationally defined in this study using items from the Earth Force Survey (Brandeis University, 2002).

Locus of Control

Locus of control was defined as an attribute that describes an individual‟s beliefs about the role of their actions in influencing outside events. An individual with an internal locus of control believes his or her actions have a significant effect on events, while one with an external locus of control attributes events to outside factors such as luck or fate (Rotter, 1966). Locus of control was measured operationally in this study

using the Environmental Action Internal Control Index developed by Smith-Sebasto and Fortner (1994).

Intention to Act

Intention to act was defined as an individual‟s stated, subjective willingness to act in a certain way (Hwang, Kim, & Jeng, 2000). In the case of this study, it refers to the students‟ stated intention to implement their conservation plan created through participation in the week-long SC3 program.

Environmental Action

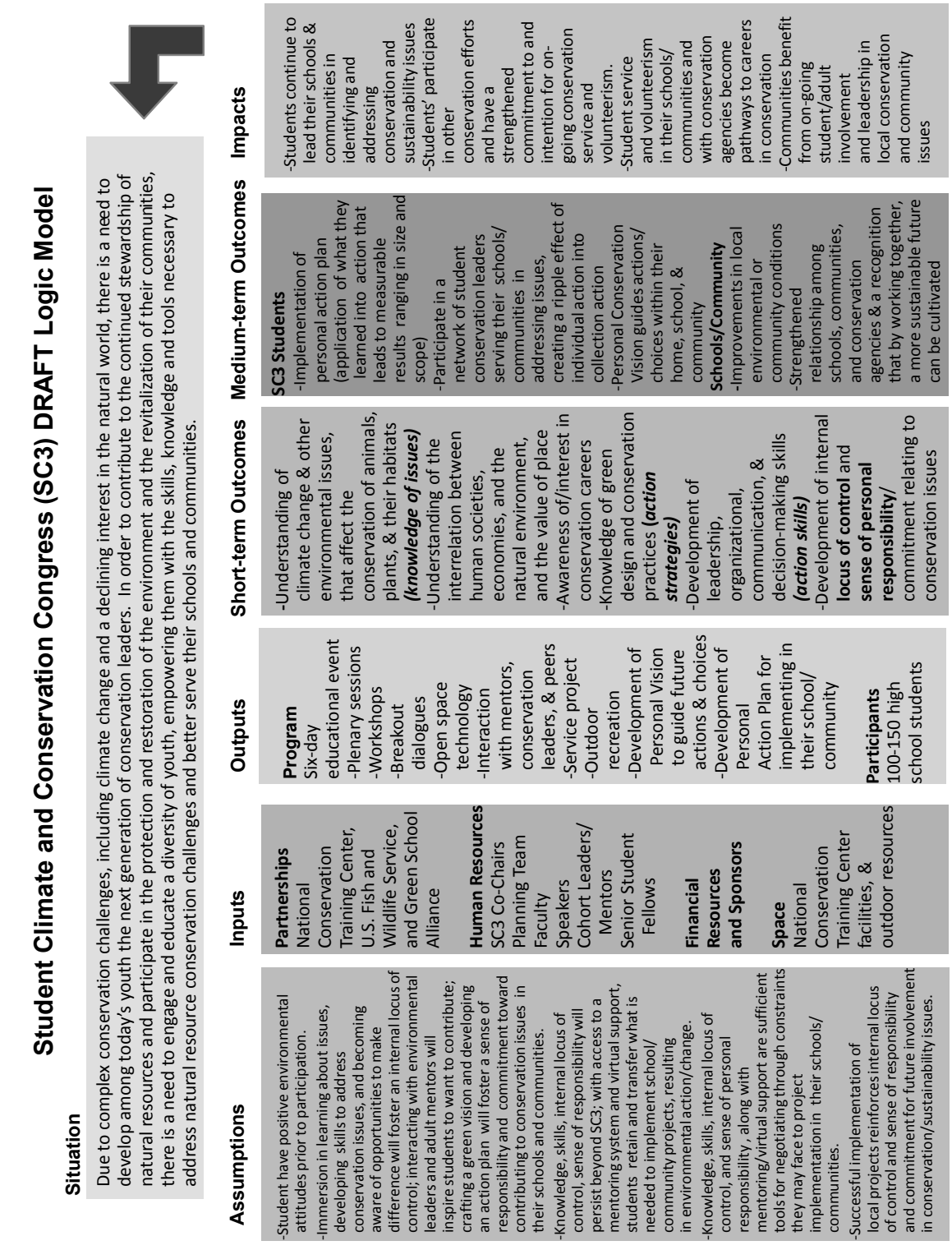
Environmental action can be defined as behavior performed with the explicit purpose to change the environment, generally in a beneficial way (Stern, 2000). According to the NAAEE‟s, it is defined as involvement in and habitual behaviors that work towards solving current problems and preventing new ones (Hollweg et al., 2011). For this study it was operationalized as SC3 participants‟ implementation of their environmental action plans/projects in their home or school communities.

Limitations of the Study

There were several limitations to this study. First, this study described the effects of SC3 on variables that may be antecedents to intention to act, action, and continued commitment toward conservation action, as well as the relationship of these variables to intention to act, action, and continued commitment. Different environmental education programs or interventions may influence these variables in other ways, and when in different contexts and settings, these variables may influence intention, action, and continued commitment differently than what was found in this SC3 study. Second, while

the Hwang, Kim, and Jeng (2000) and Hines, Hungerford, and Tomera (1986/87) models were a good fit for the SC3 program, it did not capture the entire range of variables that have been found in the research literature to influence environmental behavior. Thus, there may have been other significant factors leading to both intentions to act and project implementation that are not captured by this study. Finally, this study was conducted on a population of students already selected for their interest and potential skills in solving environmental problems, so results from this study may not be generalizable to an audience with a wider variation of levels of these predictor variables and this restriction of range may have limited the ability of these variables to predict action and continued commitment toward conservation action.

Figure 1. Logic Model of SC3



Chapter 2

LITERATURE REVIEW

Environmental Education

> The main goal of environmental education is to
>
> …develop a world population that is aware of, and concerned about, the total environment and its associated problems, and which has the attitudes, skills, motivation, and commitment to work individually and collectively towards solutions of current problems and the prevention of new ones. (Belgrade Charter, 1975).

Closely tied to this goal is the objective of developing awareness, knowledge, attitudes, skills, and participation to solve environmental problems (UNESCO, 1978). Hungerford, Peyton, and Wilke (1980) further divide environmental education into four different levels: Ecological Foundations, Conceptual Awareness, Investigation and Evaluation, and Environmental Action Skills, with each level building off of the previous levels, culminating in both the implementation of environmentally responsible behavior and action in solving environmental problems.

U.S. Fish and Wildlife Service and Environmental Education

The U.S. Fish and Wildlife Service (USFWS) is an agency within the United States Department of the Interior (DOI) with the mission of, "working with others, to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people" (USFWS, n.d.). Currently, the DOI is in the midst of implementing the *Youth in the Great Outdoors* (YGO) *Initiative*. The goal of

this initiative is to employ, educate, and engage members of the nation‟s youth with the aim of empowering them to be the next generation of conservation leaders (Youth in the Great Outdoors, n.d.).

As a means of helping the DOI meet the goals of the YGO initiative, the USFWS has implemented a number of programs to engage, employ, and educate youth. The Student Climate and Conservation (SC3) program is a USFWS endeavor to meet the "educate" component of the YGO initiative with the mission to give future student environmental leaders the skills and knowledge to address conservation issues in their communities (USFWS 2012). Besides SC3, the following programs were also developed and carried out by the USFWS (2011) to help educate today‟s youth in the great outdoors: The School Habitat/Outdoor Classroom Program; The Federal Junior Duck Stamp Conservation and Design Program; the Fisheries Conservation Education Program; the Biologists in Training program; the National Wildlife Refuge Environmental Education Program; the Shorebird Sisters program; the Refuge Junior Naturalist program; as well as other educational partnerships with outside agencies.

Environmental Behavior

Conservation issues are complex and require significant, large-scale behavior changes in order to be overcome. Thus, there is an evident need for research and theories regarding effective ways in changing environmental behaviors on individually and collectively. Several models have been proposed and tested that analyze the factors influencing positive environmental behavior.

According to Stern (2000), environmentally significant behaviors are defined by their impacts on both the materials and energy of the environment as well as the structure and function of ecosystems. Some behaviors, such as logging or pollution, have direct effects on the environment, while others, such as changing commodity prices or resource demands, have an indirect, but significant, effect. These impacts have typically been the result of human efforts towards survival, comfort, leisure, and power. In contrast to this impact-based definition of environmentally significant behavior, a second, intention-driven definition has been proposed. According to Stern, (2000), "It can now be defined from the actor"s standpoint as behavior that is undertaken with the intention to change (normally, to benefit) the environment" (p. 408).

Stern (2000) differentiates pro-environmental behavior into four major groups: environmental activism, non-activist behaviors in the public sphere, private-sphere environmentalism, and other environmentally significant behaviors. Environmental activism involves participation in environmental organizations, movements, and demonstrations. Non-activist behaviors in the public sphere include supporting pro-environmental public policies, willingness to pay high taxes leading to an environmental benefit, and other non-activist activities that individuals can do in the public sphere. Private-sphere environmentalism consists of behaviors undertaken in the home that have a positive environmental effect, such as recycling, proper disposal of hazardous waste, and energy conservation. Finally, other environmentally significant behaviors include behaviors not covered by the other groups, such as organization and business behaviors. With such a wide variety of possible pro-environmental actions, Stern (2000) simply

defines environmentalism as "…the propensity to take actions with pro-environmental intent" (p. 411).

Based on the various factors and categories of environmental behavior, Stern (2000) has proposed a value-belief-norm (VBN) theory of environmentalism. In this model, biospheric (concern for the biosphere), altruistic (concern for others), and egoistic (concern for oneself) values form the foundation of environmentalism in that they lead to the development of an ecological, human-environment worldview. Through such a worldview, individuals see that threats to the environment have a negative impact on objects or resources they value. This perception of threat, combined with a belief that the individual can reduce that threat, create an environmental obligation to take pro-environmental steps in the form of activism, non-activist public-sphere action, private-sphere action, or organizational action (Stern 2000).

In relation to the VBN theory of environmentalism, Stern (2000) also proposes a theory in which behavior is a combination of both attitudinal and contextual factors. Research into this model suggested that attitudinal factors are most influential when contextual factors are weak, but that they have little influence when there are either very positive or very negative external factors. Thus, for many environmental behaviors involving large-scale contextual factors, such as high cost or personal sacrifice, the effect of environmental attitude is greatly diminished and loses importance in comparison to contextual factors (Stern, 2000).

While the VBN theory of environmentalism is a strong, comprehensive theory, additional research has produced data that adds more depth and complexity to our

understanding of environmental behavior. A myriad of factors come together to influence positive environmental action, including locus of control, responsibility, intention to act, knowledge, social norm, sexual roles, and sensitivity (Hwang, Kim, & Jeng, 2000). Hines, Hungerford, and Tomera (1986/87) proposed a model based on a meta-analysis in which personality factors, consisting of attitudes, locus of control, and personal responsibility, interact with action skills, knowledge of action strategies, and issue knowledge to influence overall intention to act. Intention to act in turn interacts with situational factors to ultimately decide actual environmentally responsible behavior.

A model constructed by Hwang, Kim, and Jeng (2000) further refined Hungerford, Hines, and Tomera‟s model (1986/87), suggesting that knowledge directly affects locus of control and attitude, and that locus of control, attitude, and personal responsibility combine to influence an individual‟s intention to act on an environmental issue. After conducting a study testing this model, research indicated that locus of control had the largest total effect on an individual‟s intention to act in an environmentally responsible manner. In addition, locus of control had a very strong influence on an individual‟s attitude, which in turn also had a large effect on intention to act. Thus, Hwang, Kim, and Jeng (2000) suggest that stimulating an individual‟s locus of control would be an efficient and effective method of effecting change in an individual‟s environmental behaviors. The importance of locus of control directly correlates to Stern‟s (2000) VBN theory of environmentalism, which describes a perceived ability to reduce an environmental threat as a significant factor into promoting environmental behavior.

In addition to locus of control, attitude also had a relatively strong influence on intention to act, and personal responsibility had a relatively minor effect on intention to act. Finally, their research showed that general knowledge had only a small amount of influence on intention to act, implying that efforts spent increasing students‟ general knowledge might be better spent either stimulating locus of control or teaching knowledge about action skills and strategies rather than content.

Bamberg and Moser (2007) conducted a replication and extension of the Hines, Hungerford and Tomera model (1986/87). Though a meta-analysis of psycho-social determinants of pro-environmental behavior, they found three predictors of pro-environmental behavioral intention: attitude, behavioral control, and personal moral norm. They further found that problem awareness was an indirect determinant of pro-environmental intention, with its impact mediated by moral and social norms and guilt and attribution processes.

While the previously mentioned studies have explored variables leading towards intention to act, real environmental action is the actual desired outcome in any intervention targeting environmentally responsible behavior. While intention can in some cases be used to predict action, there are several barriers between intention to act and actual action. Stern (2000) identifies norms as playing a particularly important role in action. If an individual‟s intentions do not match the prevailing social norms, he or she may not be as willing to act as if the intentions matched the norms. Hines, Hungerford, and Tomera (1986/87) describe “additional factors” that influence environmental action. These factors include economic, social, or feasibility barriers to environmental action.

Thus, if these factors pose a significant enough barrier to action, intention to act may not be enough to promote environmentally responsible behavior.

Another strand of literature relevant to this study is research pertaining to life paths into environmental actions and lifestyles. Interest in and protection for the environment has been shown to be attributed to a relatively small number of common sources. These include an active parent or family member interested in nature, time spent outdoors, being involved in environmental organizations, and the environmental degradation of a valued place. While most people cite childhood as a foundational time for developing environmental attitudes, they also indicated that these childhood experiences led them to other experiences in adolescence and early adulthood that were also integral in developing their interest. In childhood and university years, experience of natural areas, participation in environmental organizations, environmental education lessons, peer groups, and having an environmental role model were shown to be the most important factors that led to individuals becoming environmental leaders (Chawla, 1999). According to Chawla (1999), environmental leaders gave four common recommendations that led to lifelong environmental action and leadership: "…be well informed about issues, work within an organization, be politically active, and conserve your energy and morale" (p 22). Environmental organizations and peer groups were especially important in fulfilling these recommendations, since they provide a place to learn as well as function as a supportive network for environmental action.

Experiences in natural areas appeared to be closely connected with having an environmental role model, indicating that the most successful outdoor experiences were those that were in the company of someone who was knowledgeable and passionate about the environment and outdoors. In the realm of education, significant emphasis was placed on the value of having opportunities to take environmental action, in contrast to passive, static classroom learning. However, closely related to environmental groups is the importance of friends and peers that influence environmental concern in a variety of ways, including inspiring someone to join an environmental group, participate in a protest, engage in an environmental career, or read environmental literature (Chawla, 1999).

Chawla and Cushing (2007) further explored environmental behavior in the context of its strategic value. While individual environmental behaviors are certainly important and worth attention, they state that strategic environmental behavior also focuses heavily on the industrial and political scale of behaviors. Thus, effective interventions in environmental behavior should focus on promoting collective environmental action. More specifically, Chawla and Cushing (2007) identified political action as the most effective environmental action, as it strongly influences environmental behaviors on all levels. Antecedents to effective environmental political action include role models and mentors, everyday experiences with nature, participation in environmental organizations, participation in discussions, seeing the results of successful political action, knowledge of environmental issues and skills, and development of a civic identity.

Environmentally Responsible Behavior to Environmental Leadership

While developing environmentally responsible behavior in today‟s youth is necessary to solve future challenges, today‟s youth must also be prepared to take environmental leadership roles in their communities. Popper, Amit, Gal, Mishkal-Sinai, and Lisak (2004) assert that leadership is a combination of self-confidence, proactive orientation, and capacity for pro-social relationships. Self-confidence is further informed by three variables- locus of control, trait anxiety, and self-efficacy. Proactive orientation refers to a leaders‟ tendency to focus on the future and set aims to change the status quo. Finally, pro-social relationships are those in which the leader has high empathy, a desire to give, and an aim of contributing to society (Popper et al., 2004). This review will focus in particular on locus of control and self-efficacy, and ways in which those traits may be fostered.

Locus of control was described by Rotter (1966) as lying along a spectrum of internal versus external beliefs about control. Individuals with an external locus of control believe that events are decided by external factors, such as luck, fate, or outside forces. In contrast, individuals with an internal locus of control view their own actions as having a direct effect on events (Rotter, 1966). Popper et al. (2004) showed that individuals with high leadership abilities also had a more internal locus of control. Karnes and McGinnis (1996) also established a correlation between internal locus of control and high leadership skills in sixth through tenth grade students. Research by Igbeneghu and Popoola (2011) showed that individuals with an external locus of control are less

committed to their respective organizations than those with an internal locus of control. Thus, locus of control takes on an important role on two fronts: first, as previously mentioned, in promoting environmentally responsible behavior. Second, it also appears to be an integral part of leadership skills.

A study conducted by Mert, Kizilci, Uğur, Küçükgüçlü, and Sezgin (2012) examined the role of problem-based learning on nursing students‟ locus of control values. Problem-based learning, characterized by student-centered learning through working toward solving a problem, is thought to develop internal locus of control. Mert et al. (2012) found that, fourth-year nursing students had a more internal locus of control than first-year students, and recommended that, in addition to problem-based learning and skills development, institutions should also provide personality development skills and focus on discerning and supporting the students‟ needs and provide regular feedback. Thus, a program with the intent of developing an internal locus of control in students would be well-served if it promoted problem-based learning and student support.

Self-efficacy, while related to locus of control, is its own important psychological factor. While locus of control is an indicator of how much control one has over external events, self-efficacy is the belief that one can confront and overcome difficult tasks and challenges. Individuals with high self-efficacy show a tendency to confront challenge, rather than avoid it (Bandura, 1997 in Gloudemans, Schalk, Reynaert, & Braeken, 2013). According to Bandura (1977), self-efficacy not only influences whether or not an individual will perform a certain activity, but it also affects the how much effort someone will put into overcoming challenging circumstances. Furthermore, self-efficacy gained in

one scenario is frequently transferred to other challenges in one‟s life. Bandura posits that there are four sources of self-efficacy: performance accomplishments, vicarious experience, verbal persuasion, and emotional arousal. Performance accomplishments are based on personal mastery experiences, and are thought to be especially influential on self-efficacy. Vicarious experience relies on seeing another person perform a threatening or challenging activity. Verbal persuasion influences behavior through suggestion. Emotional arousal generally has a negative effect on self-efficacy because it generates feelings of fear and anxiety (Bandura, 1977). A model developed by Gloudemans et al. (2013) divided vicarious experiences into two categories: peer vicarious experiences and expert vicarious experiences. Thus, individuals can develop positive self-efficacy when they are not personally experiencing an activity, leading to implications towards cooperative, network-based interactions as a positive strategy for developing self-efficacy.

Sustainability Education Theory

Just as there are many different definitions and interpretations of sustainability, there are a myriad of educational paradigms and philosophies that attempt to deal with how best to teach about sustainability to future generations. In order to gain a full perspective of sustainability and education, two competing and contradictory viewpoints will be examined and then discussed in relation to a third, integrative philosophy.

Education for sustainable development (ESD) is an outcomes-based, instrumental view where education is seen as a means to an end. The UN Decade of Education for Sustainable Development is a centerpiece in this view of education. Its goal is to inspire

changes in behavior through education that aims to help people to develop the attitudes, skills, perspectives and knowledge to make informed decisions and act upon them for the benefit of themselves and others, now and in the future" (UNESCO, 2013). A common assumption in this view of education is that raising knowledge, interest, and awareness of environmental problems will inevitably inspire personal change (Sterling, 2010).

Criticisms of ESD focus on the idea that it is destination-driven and closed-ended. In particular, Jickling and Spork (1998) contend that the idea of ESD is problematic because it implies that the goal of education is to effect a change in behavior in the population. In particular, they argue that ESD is very close to education for environmental activism. Instead of being presented with an issue and allowing learners to develop their own meanings, interpretations, and feelings, ESD teaches a specific viewpoint and agenda in an attempt to inspire a change of behavior in the population. Instead, they argue that students need to develop the ability to evaluate, analyze, and judge problems on their own instead of relying on education to provide them with the correct methods and ways of thinking.

In response to these criticisms of ESD, an intrinsic strategy towards sustainability education has emerged that avoids the outcomes-based strategies of ESD. This viewpoint acknowledge the importance and priority of solving environmental problems, but instead of educating towards behaviors that focus on solving the problems, it focuses on helping learners develop the skills and abilities to make sound, well-informed decisions, no matter what the issue is. Sustainability provides a theater and environment in which students can develop these skills, but education action is not taken. The proposed benefits

to this strategy are an increased flexibility in learners to deal with currently-unknown problems that may develop in the future as well as the guarantee that sustainability education does not cross the line of activism, therefore ensuring its continued status as legitimate education (Sterling, 2010).

As can be seen by the previous examples, sustainability education is often seen as a dichotomy between developing an intrinsic motivation towards sustainability in learners and generating specific outcomes by those learners. Sterling (2010) describes the major difference between these two philosophies as being an issue of *purpose* versus *process*, with the purpose of ESD being the implementation of behavior changes in learners, while the opposing philosophy espouses the process of developing flexible learners with the skills to confront future problems. While the argument against ESD is certainly valid, there is a benefit to ESD in that many of the issues explored by ESD are urgent and severe, and require a timely response. Sterling (2010) asserts that these two contending viewpoints can not only be reconciled, but integrated into a single definition for sustainable education, but that their respective strengths and weaknesses balance each other, leading to a stronger, more effective philosophy. More specifically, the needs-based ESD framework can incorporate the inherent flexibility in the framework provided by education focused on intrinsic motivation. The goal of this new definition of sustainability education is to develop learners who "…are able to develop *resilient social-ecological systems* in the face of a future of threat and uncertainty" (Sterling, 2010, p. 512). A resilient system is one that has the capacity "to absorb disturbance and still retain its basic function and structure" (Walker & Salt, 2006), cited in Sterling (2010).

The idea of resilience takes on a central role in the philosophy of sustainability education. Resilience is defined as the ability of a system to respond to a disturbance without changing its overall integrity (Sterling, 2010). This definition refers to both human beings and more conventional systems, including environmental, social, and economic systems. In particular, a resilient person can also be described as being a resilient learner. Bernard (2004) includes social competence, problem solving, autonomy, and sense of purpose as key components of resilience. As can be seen, these four components of resilience correspond closely to the outcomes and goals of intrinsic sustainability education. Resilience and sustainability have a close relationship, as resilient systems are sustainable, and sustainable systems are necessarily resilient. In summary, Sterling (2001) defines sustainable education as "a transformative paradigm which values, sustains and realizes human potential *in relation to* the need to attain and sustain social, economic and ecological wellbeing, recognizing that they must be part of the same dynamic" (p. 22).

Sustainability Education Strategies

Problems in conservation and sustainability are typically the result of a wide variety of human behaviors that, intentionally or not, have some type of negative effect on the environment. Thus, effective sustainability education would focus on changing those behaviors to more environmentally sound alternatives.

However, not all environmental behaviors are equal in impact, nor can they all be described in similar terms. According to Clayton and Meyers (2009), special attention should be paid to the types of behaviors that sustainability and conservation education

aim to change. Environmental behaviors can be categorized into three main groups: curtailment behavior, behavioral choices, and technology choices. Curtailment behaviors are characterized by a reduction in consumption of resources, such as limited water use, saving electricity, and waste reduction. In contrast to curtailment behaviors, behavioral choices are not decisions about reducing consumption, but rather adjusting behaviors so that activities are done in an alternative, environmentally-friendly way. Examples of behavioral choices include using public transit, purchasing sustainably produced goods, and recycling. Finally, technology choices are pro-environmental choices dependent on the purchase and use of environmentally beneficial technology. Examples of these kinds of technology include high-efficiency appliances and hybrid vehicles (Clayton & Meyers, 2009).

Each different type of behavior has its benefits and limitations. Curtailment behaviors can be intrinsically rewarding to behavior, especially in individuals and cultures that value frugality. However, curtailment behaviors can also be seen as a source of personal sacrifice that must be outweighed by financial savings, social approval, or comfort. While behavioral choices can be extremely effectively if widely implemented, they rely on individuals to develop repeated habits in order to have a significant impact. Technology choices are seen as quality of life improvements and thus are generally desirable, but they often require significant financial investment, which can be a major barrier to implementation (Clayton & Meyers, 2009).

Because sustainability and conservation issues stem from a wide variety of environmental, social, and economical factors, education regarding these topics must by

necessity also be interdisciplinary and comprehensive. While sustainability can certainly be approached from various individual disciplines, it is only by developing and teaching a new, cross-discipline knowledge base that we can develop students with an effective understanding of sustainability (Jones, Selby, & Sterling, 2010).

In addition to arguing for the importance of an interdisciplinary approach in sustainability education, Jones, Selby, and Sterling (2010) also describe a variety of teaching methods that lend themselves towards impactful sustainability education. These teaching methods include simulations, group discussions, "stimulus activities" (which include video, photography, poetry, or newspaper review), debates, case studies, personal development planning, critical reading and writing, problem-based learning, and fieldwork. The purpose of stimulus activities is to generate and encourage discussion on sustainability. These discussions can be stimulated through students watching videos, viewing photos, reading newspapers, or creating videos. In addition to stimulating discussion, these activities also allow students to generate their own viewpoints while viewing the viewpoints of others (Cotton & Winter, in Jones, Selby, & Sterling, 2010).

In problem-based learning, students are given a sustainability-related issue. The students must then research a body of knowledge about the issue and generate possible actions and solutions to the problem. This process leads them to developing a plan of action, which is then carried out. Finally, the students reflect and evaluate their plan and its impacts. Besides potentially solving a problem, this approach also increases student understanding of both the theoretical and practical applications of sustainability (Cotton & Winter, in Jones, Selby, & Sterling, 2010).

Fieldwork is an experiential process in which students confront issues in local communities. By doing so, they develop critical thinking skills, understand stakeholder perspectives, and generate reflective student learning. Furthermore, fieldwork links sustainability theories to real-world examples while students generate real solutions to problems (Cotton &Winter, in Jones, Selby, & Sterling, 2010).

One of the strongest strategies related to teaching sustainability in formal education is modeling (Higgs & McMillan, 2006). More specifically, there are four modeling strategies that are effective in teaching sustainability: individual role models, facilities and operations, governance, and culture. Individual role models can take a variety of forms, including teachers, administrators, and other students. Examples of sustainable behaviors that can be modeled include driving hybrid cars, walking as a form of transportation and community service. Students are more likely to view a person as a role model if he or she is warm and friendly (Higgs & McMillan, 2006).

Facilities and operations modeling can be defined as ways in which a physical building or location can model sustainability. A facility can model sustainability through a variety of different ways, including sustainable development (solar panels, reusing water waste, school gardens, rain collection, etc.), making community service an aspect of facility operation, and a “hidden” but transparent curriculum. One benefit of having a facility that models sustainability is that it still informs students about sustainability, but it does so in a way that is not “preachy”, as compared to traditional sustainability education. By participating in facility operations, students gain insights into how

sustainable development works. Students also develop a sense of ownership and interest in the facility through active involvement (Higgs & McMillan, 2006).

School governance is an often-neglected method of modeling sustainability. Social systems are an integral part of sustainability theory. School governance can range from traditionally hierarchical systems to a more egalitarian, student-controlled government. By encouraging student involvement in governance, schools can both teach students the basics of social systems and sustainability as well as foster the importance of student participation in government and social systems. In addition, students who participate in school governance have an increased sense of ownership and control in that school (Higgs & McMillan, 2006).

Finally, a school‟s culture is an integral part of the modeling process. School culture has been shown to have a powerful effect on students‟ beliefs and choices. In particular, school cultures that are isolated from outside cultures and run in contrast to those outside cultures are especially effective in changing student behavior. Culture can be developed through the use of traditions and rituals, some examples of which include songs, dances, and morning exercises. Schools without a distinct sustainability culture reported increased levels of apathy and cynicism towards sustainability (Higgs & McMillan, 2006).

Chapter 3

METHODS

The purpose of this quantitative study was to determine the effect participation in SC3 had on students‟ perceived environmental knowledge, perceived knowledge of citizen participation and action strategies, perceived action skills, environmental attitudes, locus of control, and personal responsibility. In addition, this study investigated the effects these variables had on students‟ intentions to act responsibly towards the environment, as well as the effects of these variables, including intention to act, on students‟ environmental action (implementation or completion of a conservation projects) and continued commitment to conservation action. This study utilized a single-group interrupted time-series experimental design to explore the various relationships posed by the research questions listed below:

1. What is the effect of participation in SC3 on students‟ perceived environmental knowledge, perceived knowledge of citizen participation and action strategies, perceived action skills, environmental attitudes, locus of control, and personal responsibility?
2. Which of the following variables significantly predicts intention to act: perceived environmental knowledge, perceived knowledge of citizen participation and action strategies, perceived action skills, environmental attitudes, locus of control, and personal responsibility?
3. Which of the following variables significantly predicts environmental action: perceived environmental knowledge, perceived knowledge of citizen participation

and action strategies, perceived action skills, environmental attitude, locus of control, personal responsibility, and intention to act?

4. Which of the following variables significantly predicts continued commitment toward conservation action: perceived environmental knowledge, perceived knowledge of citizen participation and action strategies, perceived action skills, environmental attitudes, locus of control, personal responsibility, and previous environmental action?

Theoretical Grounding

The theoretical grounding for this study was based on a model constructed by Hwang, Kim, and Jeng (2000) that explores antecedents to environmentally responsible behavior. In the model, four variables (environmental knowledge, environmental attitudes, locus of control, and personal responsibility) are identified that determine intention to act. In this model, environmental knowledge was shown to have the smallest effect on intention to act, while locus of control had the greatest. The Hwang, Kim, and Jeng (2000) model is further grounded in a model proposed by Hines, Hungerford, and Tomera (1986/87) that also lists attitudes, locus of control, and personal responsibility as antecedents to intention to act, while also subdividing the knowledge domain into action skills, knowledge of action strategies, and knowledge of issues.

Research Design

This study used quantitative research because it allows for an examination of relationships among different variables through statistical procedures (Creswell, 2009). More specifically, the research design was quasi-experimental single-group interrupted

time-series design. Experimental methods allow researchers to examine the impact of a treatment on various outcomes (Creswell, 2009). In this case, the treatment was participation in the SC3 program. Data was recorded three times throughout the course of the study in the form of a pretest, posttest, and delayed posttest.

Participants

To participate in SC3, high school students can be encouraged to apply by their teachers or can apply on their own. GSA staff review applications and select students to participate based on their interests, skills, and motivation communicated through their application responses. Because of this selection process, a control group was not feasible. All 103 students who attended the 2013 SC3 program were invited to participate in the study. Ninety-eight students participated in the data collection process.

Instrumentation

Perceived Environmental Knowledge

Perceived environmental knowledge was measured through use of a two items with a five point response format ranging from strongly disagree to strongly agree. The items were developed based on the Hollweg et al. (2011) definition of environmental knowledge as a combination of knowledge of environmental issues arising from biophysical causes and knowledge of environmental issues arising from human conflicts. These items were then altered to match the outcome goals of SC3. They were averaged together in order to create a single measure of the construct. Higher scores indicated higher levels of perceived environmental knowledge.

Perceived knowledge of Citizen Participation and Action Strategies

Perceived knowledge of citizen participation and action strategies was measured through the use of four items, with a five point response format ranging from strongly disagree to strongly agree. The items were developed based on the Hollweg et al. (2011) definition of the construct as knowledge of what students can do to help solve problems and resolve issues. The items were further altered to match SC3 program outcomes. The four items were averaged together to provide a single measure of the construct, with higher scores indicating higher levels of perceived knowledge of citizen participation and action strategies.

Perceived Action Skills

Perceived action skills were measured through use of four items, with a five point response format ranging from strongly disagree to strongly agree. These items were developed based on the Hollweg et al (2011) definition of action skills as encompassing issue investigation and identification of alternative solutions, leadership skills, organizational skills, and decision-making skills. The four items were averaged together to provide a single measure of perceived action skills, with higher scores indicating higher levels of perceived action skills.

Environmental Attitudes

Environmental attitudes were measured using an adapted version of the shortened, balanced Environmental Attitudes Inventory (Milfont & Duckitt, 2010). This construct was used because it measured environmental attitudes on a wide spectrum of categories. The 24 items in the shortened version of the environmental attitudes inventory were

further reduced to 12 items to mitigate a predicted response fatigue, since the data collection instrument was anticipated to be long in light of the number of constructs in need of being measured. The items were scored on a five point Likert-like scale. The average of these items was calculated to provide one composite score for environmental attitudes, with higher numbers indicating more positive environmental attitudes.

Locus of Control

Locus of control was measured through use of the Environmental Action Control Index (Smith-Sebasto, & Fortner, 1994). This instrument contained 28 items that measured the extent to which the participants believed that various actions would have a positive effect on the environment. Responses followed the same format as the prior constructs, with response options ranging from strongly disagree to strongly agree. The 28 items were averaged together to provide a single score for locus of control, with higher scores indicated a stronger internal locus of control.

Personal Responsibility

Personal responsibility was measured through a six items, using a five point response format ranging from strongly disagree to strongly agree. The items were adopted from the Earth Force Survey and adapted to match the context of SC3. (Brandeis University, 2002). The six items were then averaged together to form a single score, with higher scores indicating a stronger sense of personal responsibility.

Intention to Act

Intention to act was measured through four items that addressed their intention to work towards addressing an environmental issue or carrying out a project in their school

or community, stemming from their participation in SC3 and the content and issues focused upon during their week at SC3. The five point response format ranged from strongly disagree to strongly agree, and the items were averaged to form a single score, with higher scores indicating stronger behavioral intention.

Environmental Action

Environmental action was measured through participants‟ responses regarding to what extent they had worked toward completing their environmental projects (yes, working toward completion, not yet, no). Responses were coded into two groups for data analysis, with yes or working toward completion forming one group, and not yet or no forming the second group. In addition, they were asked to select which of five categories/descriptions best described the type of project they completed, and they were also asked if the project they completed was similar to what they planned during SC3. The five categories were persuasion, consumerism, political action, legal action, and eco-management (Hungerford & Peyton, 1980). Persuasive actions convince others to behave more responsibly towards the environment. Consumerism actions involve making economic decisions based on pro-environmental criteria. Political actions involve improving the environment through political means. Legal actions involved using the legal system to address environmental concerns. Eco-management refers to directly improving the physical environment.

Commitment to Continued Conservation Action

Commitment to continued conservation action was measured through four items, with a response format ranging from strongly disagree to strongly agree. Items included

intention to study conservation further in college, intention to complete further conservation projects in the community, intention toward future involvement in conservation organizations, and an intention to participate in a conservation-oriented career. The five point response format ranged from strongly disagree to strongly agree, and the items were averaged to form a single score, with higher scores indicating stronger commitment toward continued conservation action.

In addition to these instruments, a retrospective pretest-posttest instrument measuring participants‟ perceived levels of environmental knowledge, knowledge of citizen participation and action strategies, environmental attitudes, locus of control, and personal responsibility was included on the posttest to help address the possibility of a ceiling effect on the pretest scores. This consisted of six items that measured the participants‟ perceptions of their growth in those five variables during the week at SC3.

Procedures

SC3 participants were invited to participate in this study through an introductory letter with an attached consent form. Following Institutional Review Board approval, the letter was emailed to all participants in the upcoming SC3 program. The letter described the goals and nature of the study, the possible risks, and the ways in which the participants‟ confidentiality and anonymity would be protected. If the participants‟ guardians did not consent to have their child participate in the study, they signed and returned the attached negative consent form.

This quasi-experiment used a single-group interrupted time-series design. First, participants completed a pretest instrument on the same day as their arrival SC3; this

pretest measured perceived environmental knowledge, perceived knowledge of citizen participation and action strategies, perceived action skills, environmental attitudes, locus of control, and personal responsibility. At the end of the week at SC3, participants completed a posttest instrument that measured the same variables as the pretest, with the addition of intention to act and the retrospective pretest-posttest items. Eight months after completion of the program, a delayed posttest was administered online through the survey platform *Qualtrics*. This delayed posttest measured participants‟ completion of conservation projects in their home communities (environmental action) as well as commitment toward continued conservation action.

Data Analysis

Dependent sample *t* tests were used to investigate the influence of SC3 participation on students‟ perceived environmental knowledge, perceived knowledge of citizen participation and action strategies, perceived action skills, environmental attitudes, locus of control, and personal responsibility by examining changes from pre- to posttest levels of these variables. Correlational analyses and multiple regression analysis were used to determine the relationship among perceived environmental knowledge, perceived knowledge of citizen participation and action strategies, perceived action skills, environmental attitudes, locus of control, and personal responsibility, and participants‟ intention to act. Correlational analyses and multiple regression analyses were also used to determine the relationship of these variables, including intention to act, with environmental action and continued commitment toward conservation action.

Chapter 4

RESULTS

To address the research question regarding the effect of student participation in SC3 on the variables of interest, paired-samples *t* tests were conducted using the pretest and posttest data. The results of the analyses showed a significant increase across all six variables from pretest to posttest administration. See Table 1 for a summary of these results. These results suggest that participation in SC3 increased participants‟ perceived environmental knowledge, perceived knowledge of citizen participation and action strategies, perceived action skills, environmental attitudes, locus of control, and personal responsibility.

Table 1
Means of Pretest and Posttest Variables

Variables	Pre *M* (SD)	Post *M* (SD)	*t* (df)	Significance
Perceived Environmental Knowledge	4.00 (.48)	4.56 (.47)	10.02 (84)	< .001
Perceived Knowledge of Citizen Participation and Action Skills	3.63 (.59)	4.43 (.47)	12.49 (84)	< .001
Perceived Action Skills	3.87 (.68)	4.45 (.52)	8.89 (84)	< .001
Environmental Attitudes	3.90 (.42)	4.04 (.40)	3.70 (83)	<.001
Locus of Control	4.10 (.53)	4.47 (.45)	8.24 (83)	< .001
Personal Responsibility	4.38 (.48)	4.56 (.44)	4.01 (83)	< .001

Note. N = 85
Note. Response format was 1 = Strongly Disagree to 5 = Strongly Agree

There were additional items on the posttest that measured variables through a retrospective pretest-posttest design. These items were used because of the potential for a ceiling effect from participants likely having high levels of these variables prior to participating in SC3. The results of the retrospective pretest-posttest were consistent with the analysis of the pre and posttest measures, with a significant increase across participants‟ perceived levels of environmental knowledge, knowledge of citizen participation and action strategies, environmental attitudes, locus of control, and personal responsibility (see Table 2).

Table 2
Means of Retrospective Pretest and Posttest Variables

Variables	Retro Pre *M* (SD)	Retro Post *M* (SD)	*t* (df)	*p*
Perceived Environmental Knowledge	3.73 (.63)	4.80 (.40)	14.77 (85)	< .001
Perceived Knowledge of Citizen Participation and Action Strategies	3.44 (.81)	4.63 (.53)	12.77 (85)	< .001
Environmental Attitudes	4.10 (.65)	4.70 (.44)	9.07 (85)	< .001
Locus of Control	3.83 (.86)	4.60 (.64)	9.27 (85)	< .001
Personal Responsibility	4.06 (.77)	4.80 (.40)	10.27 (85)	< .001

Note. N = 82

The second research question pertained to participants‟ intention toward completing an environmental action project in their home or school communities.

Immediately following participation in SC3, participants‟ mean intention to act was 4.48 with a standard deviation of .55. This suggests participants concluded the week at SC3 with strong intentions toward completing their action projects when they returned to their home and school communities. To address the question of what variables significantly predicted intention to act, a multiple regression analysis was conducted to determine if a model consisting of the post-measures (perceived environmental knowledge, perceived knowledge of citizen participation and action strategies, perceived action skills, environmental attitude, locus of control, and personal responsibility) could be used to predict intention to act. This model was shown to significantly predict intention to act, $F(6, 80) = 9.80$, $p < .001$. The *r*-squared value of this model was .42, indicating that 42% of the variance in intention to act was explained by the significant variables. Locus of control ($B = .41$, $\beta = .32$, $p = .006$) was shown to be a significant predictor of intention to act (see Table 3). This suggests locus of control is an important construct on which to focus for programs such as SC3 where strengthening participants‟ intention to act is among desired outcomes.

Table 3
Multiple Regression Results for Intention to Act

Posttest Variables	*B* (SE)	β	*t*	*p*
Perceived Environmental Knowledge	.25 (.14)	.21	1.82	.07
Perceived Knowledge of Citizen Participation and Action Skills	.18 (.15)	.15	1.21	.23
Perceived Action Skills	.03 (.13)	.02	.19	.85
Environmental Attitudes	.07 (.14)	.05	.50	.62

Locus of Control	.41 (.14)	.33	2.81	.006
Personal Responsibility	.02 (.16)	.09	.68	.50

Note. N = 82

The third research question pertained to environmental action (participants‟ implementation or completion of a project in their home or school communities). Based on the responses from the delayed posttest (N = 45), 69% (n = 31) had already completed or were working towards completing a conservation project in their home community (see Table 4). Of those that responded to the delayed posttest item regarding their projects‟ similarity to the one planned at SC3 (N = 40), 57.5% (n = 23) reported a project similar to what had been planned at SC3, while 42.5% (n = 17) reported a project that was not similar. The delayed posttest also asked about the type of projects the participants completed. Participants were asked to indicate which category of environmental action was most similar to the project they were implementing or had completed; categories were from Hungerford and Peyton‟s (1980) and included persuasion actions, consumerism actions, political actions, legal actions, and eco-management actions. Table 5 summarizes the frequencies of project categories.

Table 4
Frequencies and Percentages of Project Completion

Project Completion State	Frequency	Percentage
Completed project	18	40.0
Working towards completion	13	28.9
Have not started, but plan to	12	26.7
Have not started, do not plan to	2	4.4

Note. N = 45

Table 5
Frequencies and Percentages of Project Type

Project Type	Frequency	Percentage
Persuasion	19	48.7
Eco-management	14	35.9
Consumerism	3	7.7
Political	3	7.7
Legal	0	0

Note. N = 39

To address the question regarding predictors of environmental action (project implementation or completion), a multiple regression analysis was conducted using the predictor variables of posttest scores on perceived environmental knowledge, perceived knowledge of citizen participation and action strategies, perceived action skills, environmental attitudes, locus of control, personal responsibility, and intention to act. The variable environmental action (project completion) had been recoded, so that nonrespondents on the delayed posttest were categorized with respondents who indicated not yet having completed a project (for participants to be considered as having "acted," they had to work on or complete a project *and* indicate having done so through the delayed posttest). This recoding was necessary, as without doing so, the sample size of the respondents was too small to run the regression analysis with the number of variables indicated by the research question. The results of this multiple regression analysis indicated that this set of variables was not able to predict environmental action, $R^2 = .05$, $F\ (7, 79) = .59$, $p = .76$. Further, none of the variables significantly predicted environmental action (see Table 6). However, there were significant zero-order

correlations between environmental attitudes prior to SC3 participation and environmental action, $r = .20$, $p = .05$ (see Table 8). If the spiraling Type I error from multiple correlations within the same data set is accounted for through Bonferroni adjustments, environmental attitudes prior to SC3 participation would not be significantly related to environmental action. It is also important to note that intention to act was not significantly correlated with environmental action ($r = .11$, $p = .32$ with n = 85 and nonrespondents recoded as not completing a project; $r = .05$, $p = .75$ with n = 45 delayed posttest respondents).

Table 6
Multiple Regression Results for Environmental Action (Project Implementation or Completion)

Posttest Variables	*B (SE)*	*β*	*t*	*p*
Perceived Environmental Knowledge	.04 (.15)	.04	.27	.79
Perceived Knowledge of Citizen Participation and Action Skills	.19 (.15)	.20	1.22	.23
Perceived Action Skills	.14 (.14)	.16	1.00	.32
Environmental Attitude	.04 (.14)	.04	.28	.78
Locus of Control	.11 (.16)	.11	.67	.51
Personal Responsibility	.07 (.06)	.07	.45	.65
Intention to Act	.135 (.18)	.167	1.16	.25

Note. N = 82

The fourth and final research question pertained to continued commitment toward conservation action. The mean score on the delayed posttest for continued commitment toward conservation action was 4.41 (SD = .50) on the five-point scale. This suggests

SC3 participants had strong intentions toward continued conservation involvement beyond SC3. To address the question regarding significant predictors of continued commitment toward conservation action, a multiple regression analysis was conducted using the predictor variables of posttest scores on perceived environmental knowledge, perceived knowledge of citizen participation and action strategies, perceived action skills, environmental attitudes, locus of control, personal responsibility, intention to act, and environmental action. The model was not significant, $R^2 = .14$, $F(8, 27) = .54$, $p = .82$, indicating these variables collectively did not predict continued commitment toward conservation action (see Table 7). Further, none of the variables were significant predictors of continued commitment toward conservation action. However, there were significant zero-order correlations between environmental attitudes prior to participating in SC3 and continued commitment toward conservation action ($r = .43$, $p = .008$) and sense of personal responsibility prior to participating in SC3 and continued commitment toward conservation action, $r = .39$, $p = .02$ (see Table 8). If Bonferroni procedures are used to adjust for the spiraling Type 1 error rate from multiple correlations run on the same family of data, personal responsibility would not be significantly related to intention towards continued commitment toward conservation. It is also important to note that action (project implementation or completion) was not significantly correlated with intention toward continued commitment toward conservation action ($r = .21$, $p = .18$ with n = 45 delayed posttest respondents).

Table 7
Multiple Regression Results for Continued Commitment to Conservation Action

Posttest Variables	*B (SE)*	*β*	*t*	*p*
Perceived Environmental Knowledge	.17 (.29)	.16	.60	.55
Perceived Knowledge of Citizen Strategies and Action Skills	.23 (.25)	.31	1.10	.28
Perceived Action Skills	.32 (.27)	.36	1.2	.24
Environmental Attitudes	.02 (.33)	.02	.06	.95
Locus of Control	.09 (.26)	.09	.33	.74
Personal Responsibility	.07 (.29)	.06	.22	.83
Intention to Act	.17 (.26)	.18	.65	.52
Environmental Action/	.01 (.19)	.01	.04	.97

Note. N = 82

Table 8
Correlations among Predictor Variables, Environmental Action, and Continued Commitment

	Perceived Env. Knowledge		Perceived Knowledge of Participation & Action Strategies		Perceived Action Skills		Attitude		Locus of Control		Personal Responsibility	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Intention to Act	.26*	.48**	.27*	.50**	.23*	.43**	.29**	.29**	.31**	.56**	.35**	.49**
Environ-mental Action	.065	.067	.065	.099	-.001	-.014	.20*	.007	.15	-.036	-.027	-.035
Commit-ment - Continued Cons. Action	.27	.18	.20	.22	.11	.034	.43**	.17	.15	.21	.39*	.19

* $p < .05$
** $p < .01$

Chapter 5

DISCUSSION

Short-term/Learning-Level Outcomes

Results of this study suggest participation in SC3 increased participants‟ perceived environmental knowledge, perceived knowledge of citizen participation and action strategies, perceived action skills, environmental attitude, locus of control, and personal responsibility. Since these variables have been shown to be antecedents to responsible environmental behavior (Hines, Hungerford, & Tomera, 1986/87; Hwang, Kim, & Jeng, 2000; Madden, Ellen, & Azjen, 1992), increases in these variables speak to the value of SC3 as an effective and important environmental education program. These increases are also notable in that participants had high levels of these constructs prior to participation, yet SC3 seems to have been able to further increase these levels in already high-scoring individuals.

Perhaps these increases are due to the research-supported methods used in SC3. Grabinger and Dunlap‟s (1995) *Rich Environments for Active Learning* framework, grounded in constructivist learning theory, suggests the importance of comprehensive instructional environments that promote investigation within authentic contexts; encourage the growth of student responsibility, initiative, decision making, and intentional learning; cultivate collaboration among students and adults; utilize interdisciplinary, generative learning activates that promote higher-order thinking processes; and assess learning within authentic contexts. These elements of rich environments for active learning are well-aligned with the approaches used during

participants‟ week at SC3, such as the use of open-space technology; the use of adult mentors; participant-adult teams working during the week toward project presentations as well as plans that can guide their work in their school or home communities; the intentional work toward developing leadership, communication and decision-making skills; and the authentic assessment of participants‟ learning through the environmental action projects they are asked to complete in their home or school communities. In addition, these strategies are consistent with problem-based learning strategies that are effective in teaching sustainability (Cotton & Winter, 2010).

The duration of SC3 (the weeklong congress in the summer followed by mentoring and project work over the school year), along with the service project during the week, participants‟ group project presentations to a panel of experts followed by an awards ceremony at the end of the congress week, and the development of personal action plans that they implement when they return to their home/school communities are consistent with what Chawla and Cushing (2007) list as being embodied in the most effective environmental education program: extended duration of time, opportunities to learn and practice action skills, and success in achieving some valued goals. Further, many of the *dynamic qualities* developed in students who participate in environmental education that have been shown to promote environmental action are consistent with desired SC3 outcomes, such as positive environmental attitudes (*showing sensitivity and concern for environmental quality*), sense of personal responsibility for environmental quality (*accepting and seeking responsibility for environmental action*), intention for

action and continued commitment toward action (*showing commitment to environmental action*) (Toili, 2007).

Intention toward Environmental Action

After their participation in the week at SC3, intention toward action (project implementation and completion) was strong. Behavioral intention is an important variable, as it is one of the few variables identified by Hines, Hungerford, and Tomera (1986/87) and Hwang, Kim, and Jeng (2000) as being directly linked to environmental action. The results from this study suggest locus of control significantly predicted intention to act; participants with a stronger internal locus of control had higher levels of intention to act. This is consistent with Hwang, Kim, and Jeng (2000), where locus of control was the strongest predictor of intention to act. This is also consistent with research by Igbeneghu and Popoola (2011), where individuals with a more external locus of control were less likely to act within and be committed to their organizations.

Since one of the desired outcomes of SC3 is for participants to leave the weeklong congress with an intention to complete a project in their home/school communities, SC3 should continue to work toward developing an internal locus of control within participants. Mert et al. (2012) have identified problem-based learning and professional feedback as very effective strategies in developing a more internal locus of control. Newhouse (1990) suggests an internal locus of control can be achieved by encouraging people to make their own decisions about problems and to critically evaluate the opinions of others. Hungerford and Volk (1990) suggest providing opportunities to apply action skills successfully can strengthen one‟s intemal locus of control. Thus, as planners

prepare for future implementation of SC3, it may be helpful for them to review SC3 program elements and agenda sessions in terms of these strategies that have been identified in the research literature to strengthen or foster an internal locus of control; elements or sessions that are consistent with these strategies should be continued, and potentially elements or sessions may need to be revised or added to strengthen participants‟ internal locus of control even further.

Environmental Action (Project Implementation or Completion)

While intention to act is important, SC3 also seeks to inspire actual environmental action (completion of a project in participants‟ schools or home communities). Many of the participants in SC3‟s weeklong congress do go on to implement environmental projects in their school or home communities. Of the 45 respondents to the delayed posttest, 31 indicated they were working toward completion or had already completed their projects. However, with 37 nonrespondents, there is a need for follow-up efforts to determine if nonrespondents consistently did not complete a project, or if some did but did not take time to respond. Institutional Review Board approval did not include permission to contact nonrespondents, due to the anonymous nature of participation. However, SC3 planners might consider contacting a number of SC3 participants to ask if they responded to the delayed posttest and if not, why they did not. This would allow for a better estimate of project completion rate.

Results of the multiple regression analysis suggest that none of the explanatory variables (the learning-level outcomes of SC3: posttest levels of perceived environmental knowledge, perceived knowledge of citizen participation and action strategies, perceived

action skills, environmental attitudes, locus of control, personal responsibility, and intention to act) significantly predicted environmental action. It was expected that at least locus of control, environmental attitudes, and sense of personal responsibility (similar to moral norm) would have been significant, in light of results from Bamberg and Moser‟s meta-analysis of psycho-social determinants of pro-environmental behavior (2007). This likely may be due to the restriction of range (characterized by scores trending towards the higher ends of the scales, leading to less variation in this population of SC3 participants than might be expected in a "general" population), which may have limited their collective and individual ability to predict environmental action. This suggests the need for instrument development within an environmental education context to better distinguish variations among these constructs of interest in participants who have relatively high starting levels of these constructs (for example, an instrument designed to measure environmental attitudes for use with people having positive environmental attitudes, rather than typical environmental attitude instruments that are designed for "general audiences" with attitude levels ranging from very negative to very positive).

It also may be that there are variables missing in this regression model that would account for variation in environmental action. This would suggest that perhaps SC3 is missing an important learning-level program outcome that could be targeted in order to better explain or better predict those who complete projects from those who do not. Chawla and Cushing (2007) identify personal sense of competence and collective sense of competence as antecedents for political and public environmental action. Alternatively, Heberlein (2012) suggests four elements necessary for changing behavior: time; clear and

specific behavior targeted for change; high status public leadership; and values that are consistent with attitudes. SC3 provides time, as well as the facilitation of personal action plans/project ideas that target specific behaviors. If it is assumed that participants‟ values are consistent with their positive environmental attitudes (or if participants‟ values are measured and become part of the regression model), it is possible that high status public leadership was present during the weeklong congress, but then present to varying degrees or lacking in participants‟ school/home communities. Perhaps SC3 planners could consider helping participants connect with high status leaders in their communities, such as a USFWS manager at a nearby refuge who could support the SC3 participant in project implementation.

Additionally, Bamberg and Moser (2007), in their replication and extension of the Hines, Hungerford, and Tomera (1986/87) study, present the effects of problem awareness, internal attribution, social norm, and feelings of guilt along with the more proximal or direct behavioral determinants of perceived behavioral control, attitude, moral norm, and intention on environmental behavior. Based on this list of indirect effects, it is likely that SC3 is having an influence on problem awareness, which is similar to environmental knowledge, but did not significantly predict action in SC3 participants. It also seems likely that through bringing together "like-minded" participants who share environmental interests and providing them with opportunities to interact with adults and environmental leaders, SC3 may be influencing participants‟ perceptions of a social norm where action on behalf of the environment is viewed as appropriate (SC3 may be creating a social reference group where pro-environmental

behavior is viewed as the right thing to do). The degree to which students perceive this pro-environmental social norm was not measured in this study, nor was it included in the regression model. This might be an important variable to include in future SC3 research, in light of additional research suggesting the role of socio-cultural factors, including social norms, on engagement and action (Etkin & Ho, 2007; Kollmuss & Agyeman, 2002). Perhaps, if measured, social norm following the weeklong SC3 congress, would be positively influencing intention to act, but then when participants return to their school and home communities where a pro-environmental social norm is not as strong or even lacking, the positive social norm influence on intention might change to a negative influence on behavior. If this were found to be the case, SC3 planners could think about how to further support that pro-environmental social norm during the project implementation period, such as through social media or helping participants link into environmental networks or organizations closer to home.

For SC3 participants, intention to act was not significantly related to action, in contrast with Hines, Hungerford, and Tomera (1986/87), where a mean correlation of r = .49 was reported (6 studies) and in contrast with Bamberg and Moser (2007), where a mean correlation of r = .52 was reported (15 studies). The restriction of range on variables measured may account for this lack of significance. However, often barriers intervene between intention and action, and that could likely be the case for SC3 participants (Hines, Hungerford, & Tomera, 1986/87; Kollmuss & Agyeman, 2002). Perhaps SC3 participants who successfully completed a project were better able to negotiate some of the barriers to environmental action. Or perhaps they encountered

fewer barriers, or perhaps they perceived the strength of these barriers to be less strong then those who didn‟t complete projects. Hines, Hungerford, and Tomera (1987) include barriers as situational factors in their model, which can include economic constraints, social pressures, and opportunities for other actions. Blake (1999) identifies these similar barriers "practicality" barriers, such as lack of time, money, encouragement, or information. Kollmuss and Agyeman (2002), citing Stern, Dietz, and Karlof (1993), add a weighing of priorities to the list of potential barriers. Further research could be conducted to understand what barriers SC3 participants encounter, the strength they perceive these barriers to be, and how some participants managed to overcome them (what constraint negotiation skills were used); these could be targeted in future SC3 implementation, both during the weeklong congress and through some form of follow-up support during the project implementation period.

There was a significant zero-order correlation between environmental attitudes prior to SC3 participation and environmental action (prior to controlling for the spiraling Type I error through the Bonferroni procedure), potentially suggesting the importance of environmental attitudes. While research seems to indicate that attitudes alone are usually not enough to lead to environmental action, they do play a key component in motivating those with the skills and abilities to take action to do so. However, rather than directly changing environmental attitudes, it may be more beneficial to align a program‟s communications to the existing attitudes of its audience (Ardoin, Heimlich, Braus, & Merrick, 2013). In the case of SC3, this might mean focusing more on inspiring a specific, positive attitude towards action (project completion) and less trying to inspire a

more general, vague positive attitude towards the environment itself. Another implication of this finding lies in the selection process for SC3. If SC3 is aiming to encourage environmental action (project completion) in its participants, it might be well-served to screen applicants for higher environmental attitudes. By doing so, they can focus less on developing those attitudes and more on providing the skills and abilities necessary to surmount barriers to project completion.

Continued Commitment toward Conservation Action

In addition to being a concern of many conservation agencies, a primary aim of SC3 is continued commitment toward conservation action. Based on the delayed posttest results, SC3 participants had strong intentions toward continued commitment toward conservation action. The results of this study suggest none of the variables (posttest levels in perceived environmental knowledge, perceived knowledge of citizen participation and action strategies, perceived action skills, environmental attitudes, locus of control, personal responsibility, intention to act, and environmental action/project completion) predicted continued commitment toward conservation action. Nor was environmental action significantly related to continued commitment, suggesting completion of a project did not reinforce an intention for further action, which would be expected based on Chawla and Cushing (2007). As mentioned prior, the restriction of range of variables measured may be the source of the lack of predictive ability of this model. Future qualitative research might explore what participants‟ perceive to be the source of their continued commitment toward conservation action. This would help suggest if there is an important program outcome variable not accounted for in the regression model that

would significantly predict continued commitment that should be targeted in future SC3 implementation in order to strengthen continued commitment toward conservation action.

De Young (1993) identifies commitment to conservation as an important tool for changing conservation behaviors because it creates durable change that "sticks" and does not fade over time. Other strategies, such as incentives and coercion, can create rapid change, but these changes are generally not durable and fade over time (De Young, 1993). Research relating to volunteerism gives insight into promoting commitment toward conservation action. Volunteers often indicate they are motivated by some concern and are rewarded by seeing progress toward addressing that concern and by the sense of satisfaction that comes from their labor (Ardoin et al., 2013). In addition, they are motivated toward continued commitment by meeting and working with others who share their passion and being part of a group that is identified with environmental goals. This is consistent with social learning theory, which emphasizes value in seeing others within one"s social group taking action (Ardoin et al., 2013).

While there were no significant predictors of continued commitment to conservation, environmental attitudes and personal responsibility prior to participating in SC3 were significantly related to continued commitment to conservation (significant zero-order correlations). Using Bonferroni procedures to adjust for the spirally Type I error rate, only environmental attitudes prior to SC3 participation remained significant. One approach would be to focus on strengthening these attributes (environmental attitudes and potentially sense of personal responsibility) in SC3 participants. Benton, Farmer, and Knapp (2007) suggest that direct aesthetic experiences with nature,

environmental restoration activities, emotional content, a multisensory learning environment, and relevant and personal information to promote ownership and empowerment are all successful strategies in strengthening positive environmental attitudes. Ardoin et al. (2013) identify solving local environmental issues through a school or other organization as one method of fostering personal responsibility. Thus, SC3 planners might consider how these strategies currently align or could be added to current program elements and sessions during the weeklong congress and through the follow-up implementation of projects in home/school communities.

An alternative implication is for SC3 to continue selecting students for participation through an application process, making strong positive environmental attitudes and a strong sense of personal responsibility a more deliberate part of the selection criteria, as ultimately SC3 is interested in developing and supporting the next generation of conservation leaders. Strategically selecting promising participants does not seem to be a common strategy in environmental education. But as concerns in natural resource management agencies grow regarding the continuation of a conservation ethic, being strategic in participant selection perhaps needs to be considered as part of the "roadmap that will lead to the next generation of conservation leaders" (USFWS, 2011, p. 2).

Conclusion

This study answered many questions related to the effectiveness of SC3 in achieving desired program outcomes, as well as how these short-term/learning-level outcomes are related (and often not related) to environmental action and continued

commitment. Thus, findings can be used to guide SC3 planners in future implementation of SC3, as well as the field of environmental education in thinking about programming for youth who show "promise" as future environmental leaders. This study also raised many relevant questions that are the grounds for further research. While more research is needed, SC3 appears to be a promising intervention that is making an important contribution toward conservation goals, as well as providing insight into characteristics of environmental education programs that effectively encourage environmental action and commitment.

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APPENDIX A

Initial Consent and Reconsent Forms

CONSENT FORM

Developing the Next Generation of Environmental Leaders: Promoting Environmentally Responsible Behavior Through the Student Climate and Conservation Congress

Dear Parents,

My name is Nathaniel Blood. I am a graduate student at the University of Minnesota Duluth pursuing a Master‟s degree in Environmental Education.

Your child is invited to be in a research study of the effectiveness of the Student Climate and Conservation Congress (SC3) program. Your child was selected as a possible participant because they will be participating in the program this summer. In order to collect as much meaningful data as possible, I am inviting all students involved in the SC3 program to participate in this study. We ask that you read this form and ask any questions you may have before agreeing to be in the study.

The purpose of this study is to examine how the Student Climate and Conservation Congress program affects different variables that have been shown to promote environmentally responsible behavior.

If you consent for your child to be in this study, we would ask them to fill out three short questionnaires. The first would be filled out on the first day of the SC3 program, and would take approximately 20 minutes. The second questionnaire would be filled out on the last day of the SC3 program and would be about the same length. The final questionnaire would be accessed online approximately 6 months after the end of the SC3 program. It would be slightly shorter than the previous 2 questionnaires. The questionnaires would ask about several different subjects, such as attitudes towards the environment, sense of personal responsibility, personal control over the environment, general knowledge, and commitment to environmental action.

There are no foreseeable risks to your child in this study. Furthermore, your child‟s participation will be beneficial to both the program planners of SC3 as well as the field of environmental education as a whole in showing how programs can foster environmentally responsible behavior. There is no direct benefit to subjects who participate in this research.

Your child‟s answers to the responses will be kept strictly anonymous. Their name will never be connected with their responses, and their name will not be recorded in any report published from this study. Research records will be stored securely and only

researchers will have access to the records. Study data will be encrypted according to current University policy for protection of confidentiality. Only I and my advisor, Julie Ernst, will have access to records of this study.

Participation in this study is completely voluntary. Your decision whether or not to participate will not affect your child‟s current or future relations with the Fish and Wildlife Service, the Green Schools Alliance, or the University of Minnesota. Furthermore, your child‟s participation will not in any way affect his or her participation or experience in the SC3 program. If your child decides to participate, he or she is free to not answer any question or withdraw at any time without affecting those relationships.

If you have any questions now or at a later time, please feel free to contact me at blood046@d.umn.edu, or my advisor, Julie Ernst, at jernst@d.umn.edu. Feel free to also call us at (218-726-6761). If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), **you are encouraged** to contact the Research Subjects‟ Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.

You will be given a copy of this information to keep for your records.

If you consent for your child to participate in this study, no further action is required.

If you <u>do not</u> consent, please complete and bring this form to SC3 to turn in.

Statement of Negative Consent:

I have read the above information. I have asked questions and have received answers. I **<u>do not</u>** consent for my child to participate in the study.

Signature:_____ Date: _____

Signature of parent or guardian:_____ Date:_____

This form is only applicable to participants in the 2013 SC3 program who have turned 18 years old between signing the initial consent form in April/May of 2013 and now. If you are not 18, or if you were 18 when you signed the initial form, there is no need to complete this form.

RE-CONSENT FORM

Developing the Next Generation of Environmental Leaders: Promoting Environmentally Responsible Behavior Through the Student Climate and Conservation Congress

Dear SC3 Participant,

My name is Nathaniel Blood. I am a graduate student at the University of Minnesota Duluth pursuing a Master‟s degree in Environmental Education.

Prior to the Student Climate and Conservation Congress (SC3) you were invited to be in a research study of the effectiveness of the Student Climate and Conservation Congress (SC3) program. You were selected as a possible participant because you participated in the SC3 program this summer. In order to collect as much meaningful data as possible, I am inviting all students involved in the SC3 program to participate in this study. I ask that you read this form and ask any questions you may have before agreeing to be in the study.

The purpose of this study is to examine how the Student Climate and Conservation Congress program affects different variables that have been shown to promote environmentally responsible behavior.

If you consent to be involved in the final portion of this study, we would ask you to fill out a short questionnaire. This questionnaire would be accessed and submitted online. It would ask about several different subjects, such as attitudes towards the environment, sense of personal responsibility, personal control over the environment, general knowledge, commitment to environmental action, and environmental actions you have taken since completing the SC3 program.

There are no foreseeable risks in this study. Furthermore, you participation will be beneficial to both the program planners of SC3 as well as the field of environmental education as a whole in showing how programs can foster environmentally responsible behavior. There is no direct benefit to subjects who participate in this study.

Your responses will be kept strictly anonymous. Your name will never be connected with your responses, and your name will not be recorded in any report published from this study. Research records will be stored securely and only researchers will have access to the records. Study data will be encrypted according to current University policy for protection of confidentiality. Only I and my advisor, Julie Ernst, will have access to records of this study.

Participation in this study is completely voluntary. Your decision whether or not to participate will not affect your current or future relations with the Fish and Wildlife Service, the Green Schools Alliance, or the University of Minnesota. Furthermore, your participation will not in any way affect your participation or experience in the SC3 program. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

If you have any questions now or at a later time, please feel free to contact me at blood046@d.umn.edu, or my advisor, Julie Ernst, at jernst@d.umn.edu. Feel free to also call us at (218-726-6761). If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), **you are encouraged** to contact the Research Subjects‟ Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.

You will be given a copy of this information to keep for your records.

If you consent to participate in this study, no further action is required.

If you <u>do not</u> consent to participate, please complete and return this form.

Statement of Negative Consent:

I have read the above information. I have asked questions and have received answers. I **<u>do not</u>** consent to participate in the study.

Signature:_____ Date: _____

APPENDIX B

Pretest Questionnaire

Please fill in the following information:
Your birth month:_____
Your first and middle initial:_____

Please circle the responses to the following questions as honestly as you can. There are no right or wrong answers!

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I have an understanding of the conservation or climate-related issues facing my community.	SD	D	N	A	SA
2. I have an understanding of the interrelationship among human societies, economics, and the natural environment	SD	D	N	A	SA
3. I know what it takes to change the rules and laws that affect the environment in my school or community.	SD	D	N	A	SA
4. I know how to bring awareness of environmental issues to the attention of my community.	SD	D	N	A	SA
5. I know about green design and other conservation practices that could be used to address environmental and conservation issues.	SD	D	N	A	SA
6. I have the knowledge and skills needed to investigate environmental issues by synthesizing data from primary and secondary sources of information.	SD	D	N	A	SA
7. I am knowledgeable about a variety of forms that environmental action can take, such as persuasion, consumerism, political action, ecological action, etc.	SD	D	N	A	SA
8. I have leadership skills that I can use in addressing environmental issues in my community.	SD	D	N	A	SA
9. I have organization skills that I can use in addressing environmental issues in my community.	SD	D	N	A	SA
10. I have decision-making skills that I can use to make decisions about which environmental action strategies to use for particular environmental issues.	SD	D	N	A	SA

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I'd prefer a garden that is wild and natural to a well groomed and ordered one.	SD	D	N	A	SA
2. Whenever possible, I try to save natural resources.	SD	D	N	A	SA
3. Human being were created or evolved to dominate the rest of nature.	SD	D	N	A	SA
4. Protecting peoples' jobs is more important than protecting the environment.	SD	D	N	A	SA
5. It makes me sad to see forests cleared for agriculture.	SD	D	N	A	SA
6. Families should be encouraged to limit themselves to two children or less.	SD	D	N	A	SA
7. I really like going on trips into the countryside, for example to forests, fields, or other natural areas.	SD	D	N	A	SA
8. I am opposed to governments controlling and regulating the way raw materials are used in order to try and make them last longer.	SD	D	N	A	SA
9. I would like to join and actively participate in an environmentalist group.	SD	D	N	A	SA
10. We need to keep rivers and lakes clean in order to protect the environment, and NOT as places for people to enjoy water sports.	SD	D	N	A	SA
11. Modern science will NOT solve our environmental problems.	SD	D	N	A	SA
12. Humans are severely abusing the environment.	SD	D	N	A	SA

Please read the partial statement in bold letters below followed by the action described after each number. Then, circle the choice which best indicates how strongly you agree or disagree with the whole statement.

My individual actions would <u>improve the quality of the environment</u> if I were to…

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. …learn about the recycling facilities in my area.	SD	D	N	A	SA
2. …attend a community meeting that involves concern over a local environmental issue.	SD	D	N	A	SA
3. …buy resource conservation devices, such as low-flow faucet aerators for my sink and low-flow shower heads.	SD	D	N	A	SA
4. …buy products packaged in containers that either can be reused or recycled or are made of recycled materials.	SD	D	N	A	SA
5. …report someone who violates a law or laws that protect our natural resources (e.g., illegal fishing, hunting, trapping, or illegal tree cutting) to the proper authorities.	SD	D	N	A	SA
6. …report someone who tampers with the anti-pollution devices on a car to the proper authorities.	SD	D	N	A	SA
7. ...reduce the amount of my household trash by reusing or recycling items to the fullest extent possible.	SD	D	N	A	SA
8. ...set my home appliances, such as the refrigerator, dishwasher, water heater, etc. to 'energy saver' levels.	SD	D	N	A	SA
9. ...take my old tires to a recycling center.	SD	D	N	A	SA
10. ...carpool instead of driving alone.	SD	D	N	A	SA
11. ...open windows for ventilation rather than using a fan or air conditioner.	SD	D	N	A	SA
12. ...convince someone to boycott a store that sells products that damage the environment.	SD	D	N	A	SA
13. ...convince someone to sign a petition regarding and environmental issue.	SD	D	N	A	SA
14. ...convince someone to learn about the recycling facilities in her/his area.	SD	D	N	A	SA
15. ...convince someone to have a home 'energy audit' to find the heat leaks in her/his house or apartment.	SD	D	N	A	SA
16. ...convince someone to obtain a copy of	SD	D	N	A	SA

the League of Conservation Voters' Environmental Scorecard.					
17. ...convince someone to buy household cleaning and/or laundry products that don't harm the environment.	SD	D	N	A	SA
18. ...convince someone to buy fruits and vegetables loose rather than in plastic bags.	SD	D	N	A	SA
19. ...convince someone to buy products packaged in containers that either can be reused or recycled or are made of recycled materials.	SD	D	N	A	SA
20. ...convince someone to report someone who violated a law or laws that protect our natural resources (e.g., illegal fishing, hunting, or trapping or illegal tree cutting) to the proper authorities.	SD	D	N	A	SA
21. ...convince someone to reuse envelopes by putting a label over the old address.	SD	D	N	A	SA
22. ...convince someone to set her/his household appliances, such as the refrigerator, dishwasher, water heater, etc. to 'energy saver' levels.	SD	D	N	A	SA
23. ...convince someone to keep her/his car tires properly inflated.	SD	D	N	A	SA
24. ...convince someone to take old tires to a recycling center.	SD	D	N	A	SA
25. ...convince someone to conserve water by not running the water while brushing her/his teeth or shaving and/or installing a water saving device in the tank of her/his toilet(s).	SD	D	N	A	SA
26. ...convince someone to avoid idling her/his car unnecessarily.	SD	D	N	A	SA
27. ...convince someone to reduce the amount he/she drives her/his car by carpooling instead of driving alone.	SD	D	N	A	SA
28. ...convince someone to reduce the amount of her/his household trash by reusing or recycling items to the fullest extent possible.	SD	D	N	A	SA

Please rate how much you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I feel that it is my responsibility to help solve environmental issues in my community.	SD	D	N	A	SA
2. I think each person in the community should do what he or she can to protect the environment.	SD	D	N	A	SA
3. I feel it is my responsibility to encourage others to help solve environmental issues in the community.	SD	D	N	A	SA
4. I feel it is my responsibility to do what I can to contribute to the protection and restoration of the environment.	SD	D	N	A	SA
5. Because my personal negative impact on environmental quality is small, I don't feel responsible for helping address environmental issues, such as climate change.	SD	D	N	A	SA
6. My behavior and actions in the environment should provide a good example to others.	SD	D	N	A	SA

Appendix C

Posttest Questionnaire

Please fill in the following information:
Your birth month:_____
Your first and middle initial:_____

Please circle the responses to the following questions as honestly as you can. There are no right or wrong answers!

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I have an understanding of the conservation or climate-related issues facing my community.	SD	D	N	A	SA
2. I have an understanding of the interrelationship among human societies, economics, and the natural environment	SD	D	N	A	SA
3. I know what it takes to change the rules and laws that affect the environment in my school or community.	SD	D	N	A	SA
4. I know how to bring awareness of environmental issues to the attention of my community.	SD	D	N	A	SA
5. I know about green design and other conservation practices that could be used to address environmental and conservation issues.	SD	D	N	A	SA
6. I have the knowledge and skills needed to investigate environmental issues by synthesizing data from primary and secondary sources of information.	SD	D	N	A	SA
7. I am knowledgeable about a variety of forms that environmental action can take, such as persuasion, consumerism, political action, ecological action, etc.	SD	D	N	A	SA
8. I have leadership skills that I can use in addressing environmental issues in my community.	SD	D	N	A	SA
9. I have organization skills that I can use in addressing environmental issues in my community.	SD	D	N	A	SA
10. I have decision-making skills that I can use to make decisions about which environmental action strategies to use for particular environmental issues.	SD	D	N	A	SA

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I'd prefer a garden that is wild and natural to a well groomed and ordered one.	SD	D	N	A	SA
2. Whenever possible, I try to save natural resources.	SD	D	N	A	SA
3. Human being were created or evolved to dominate the rest of nature.	SD	D	N	A	SA
4. Protecting peoples' jobs is more important than protecting the environment.	SD	D	N	A	SA
5. It makes me sad to see forests cleared for agriculture.	SD	D	N	A	SA
6. Families should be encouraged to limit themselves to two children or less.	SD	D	N	A	SA
7. I really like going on trips into the countryside, for example to forests, fields, or other natural areas.	SD	D	N	A	SA
8. I am opposed to governments controlling and regulating the way raw materials are used in order to try and make them last longer.	SD	D	N	A	SA
9. I would like to join and actively participate in an environmentalist group.	SD	D	N	A	SA
10. We need to keep rivers and lakes clean in order to protect the environment, and NOT as places for people to enjoy water sports.	SD	D	N	A	SA
11. Modern science will NOT solve our environmental problems.	SD	D	N	A	SA
12. Humans are severely abusing the environment.	SD	D	N	A	SA

Please read the partial statement in bold letters below followed by the action described after each number. Then, circle the choice which best indicates how strongly you agree or disagree with the whole statement.

My individual actions would <u>improve the quality of the environment</u> if I were to…

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. …learn about the recycling facilities in my area.	SD	D	N	A	SA
2. …attend a community meeting that involves concern over a local environmental issue.	SD	D	N	A	SA
3. …buy resource conservation devices, such as low-flow faucet aerators for my sink and low-flow shower heads.	SD	D	N	A	SA
4. …buy products packaged in containers that either can be reused or recycled or are made of recycled materials.	SD	D	N	A	SA
5. …report someone who violates a law or laws that protect our natural resources (e.g., illegal fishing, hunting, trapping, or illegal tree cutting) to the proper authorities.	SD	D	N	A	SA
6. …report someone who tampers with the anti-pollution devices on a car to the proper authorities.	SD	D	N	A	SA
7. ...reduce the amount of my household trash by reusing or recycling items to the fullest extent possible.	SD	D	N	A	SA
8. ...set my home appliances, such as the refrigerator, dishwasher, water heater, etc. to 'energy saver' levels.	SD	D	N	A	SA
9. ...take my old tires to a recycling center.	SD	D	N	A	SA
10. ...carpool instead of driving alone.	SD	D	N	A	SA
11. ...open windows for ventilation rather than using a fan or air conditioner.	SD	D	N	A	SA
12. ...convince someone to boycott a store that sells products that damage the environment.	SD	D	N	A	SA
13. ...convince someone to sign a petition regarding and environmental issue.	SD	D	N	A	SA
14. ...convince someone to learn about the recycling facilities in her/his area.	SD	D	N	A	SA
15. ...convince someone to have a home 'energy audit' to find the heat leaks in her/his house or apartment.	SD	D	N	A	SA
16. ...convince someone to obtain a copy of the League of Conservation Voters' Environmental	SD	D	N	A	SA

Scorecard.					
17. ...convince someone to buy household cleaning and/or laundry products that don't harm the environment.	SD	D	N	A	SA
18. ...convince someone to buy fruits and vegetables loose rather than in plastic bags.	SD	D	N	A	SA
19. ...convince someone to buy products packaged in containers that either can be reused or recycled or are made of recycled materials.	SD	D	N	A	SA
20. ...convince someone to report someone who violated a law or laws that protect our natural resources (e.g., illegal fishing, hunting, or trapping or illegal tree cutting) to the proper authorities.	SD	D	N	A	SA
21. ...convince someone to reuse envelopes by putting a label over the old address.	SD	D	N	A	SA
22. ...convince someone to set her/his household appliances, such as the refrigerator, dishwasher, water heater, etc. to 'energy saver' levels.	SD	D	N	A	SA
23. ...convince someone to keep her/his car tires properly inflated.	SD	D	N	A	SA
24. ...convince someone to take old tires to a recycling center.	SD	D	N	A	SA
25. ...convince someone to conserve water by not running the water while brushing her/his teeth or shaving and/or installing a water saving device in the tank of her/his toilet(s).	SD	D	N	A	SA
26. ...convince someone to avoid idling her/his car unnecessarily.	SD	D	N	A	SA
27. ...convince someone to reduce the amount he/she drives her/his car by carpooling instead of driving alone.	SD	D	N	A	SA
28. ...convince someone to reduce the amount of her/his household trash by reusing or recycling items to the fullest extent possible.	SD	D	N	A	SA

Please rate how much you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I feel that it is my responsibility to help solve environmental issues in my community.	SD	D	N	A	SA
2. I think each person in the community should do what he or she can to protect the environment.	SD	D	N	A	SA
3. I feel it is my responsibility to encourage others to help solve environmental issues in the community.	SD	D	N	A	SA
4. I feel it is my responsibility to do what I can to contribute to the protection and restoration of the environment.	SD	D	N	A	SA
5. Because my personal negative impact on environmental quality is small, I don't feel responsible for helping address environmental issues, such as climate change.	SD	D	N	A	SA
6. My behavior and actions in the environment should provide a good example to others.	SD	D	N	A	SA

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I have identified an environmental issue in my school/community that I intend to work towards addressing.	SD	D	N	A	SA
2. I have a specific idea to address an environmental, conservation, or sustainability issue in my community.	SD	D	N	A	SA
3. I have a specific plan to address an environmental, conservation, or sustainability issue in my community.	SD	D	N	A	SA
4. When I return home I will get others interested in helping address an environmental, conservation, or sustainability issue in my community.	SD	D	N	A	SA

For the following statements, please circle the option that best indicates how you agree with the statement <u>before</u> participating in SC3 and <u>right now</u>.
SD= Strongly Disagree, D = Disagree, N = Neutral, A = Agree, SA = Strongly Agree

	<u>Before</u> SC3					**Right Now**				
1. I am knowledgeable about environmental issues.	SD	D	N	A	SA	SD	D	N	A	SA
2. I am knowledgeable about the action skills and strategies that can be used to address environmental issues.	SD	D	N	A	SA	SD	D	N	A	SA
3. I have a positive attitude towards the environment.	SD	D	N	A	SA	SD	D	N	A	SA
4. I have a positive attitude towards taking action on behalf of the environment.	SD	D	N	A	SA	SD	D	N	A	SA
5. I believe my actions can make a difference in identifying and resolving environmental issues.	SD	D	N	A	SA	SD	D	N	A	SA
6. I feel it is my responsibility to contribute to addressing and resolving environmental, sustainability, and conservation issues.	SD	D	N	A	SA	SD	D	N	A	SA

APPENDIX D

Delayed Posttest Questionnaire

Please fill in the following information:
Your birth month:_____
Your <u>first</u> and <u>middle</u> initial:_____
Please select the responses to the questions honestly. There are no right or wrong answers!

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I intend to continue to lead my school or community in identifying and addressing conservation, sustainability, and environmental issues.	SD	D	N	A	SA
2. In the future I intend to participate in other conservation efforts or conservation organizations through service and volunteerism.	SD	D	N	A	SA
3. I plan to take a class/classes in college that will help me learn more about addressing conservation or sustainability issues.	SD	D	N	A	SA
4. I am considering a career in an environmental field.	SD	D	N	A	SA

5. As a result of my participation in SC3, I have completed an environmental project in my community.

Yes **I am working towards completing a project** **Not yet (but plan to)** **No**

6. If you answered "Yes" or "I am working towards completing a project" to question 5, is your project similar to what you planned during your week at SC3?

Yes **No**

7. Please indicate which category best describes your <u>project</u>. If more than one category fits, choose the one that is the <u>most</u> relevant:

- I persuaded others to behave more responsibly towards the environment.
  Example: You delivered a speech on supporting local food production.
  Example: You developed a school-wide campaign to encourage recycling.

- I worked towards changing the behavior of a company or industry to benefit the environment.
  Example: You organized a boycott of a company with a history of causing severe pollution.
  Example: You organized your community into supporting companies with responsible environmental policies.

- I pursued environmental action through political means.
  Example: You wrote letters to members of Congress to encourage them to support a pro-environment bill.
  Example: You organized support for a political candidate with strong pro-environment views
- I worked on a project that directly benefited the physical environment.
  Example: You restored a native wetland.
  Example: You built and installed bird boxes that benefited a threatened species.

- I supported the environment through legal action.
  Example: You made law enforcement aware of illegal activities that were harmful to the environment.
  Example: Your organized a class-action lawsuit against a company with harmful environmental policies.

8. If you answered “Yes” or “I am working towards completing a project” to question 5, please describe your project. If you haven’t finished your project, just write down what you’ve done to this point, and what you plan to do in the future.