SIGNIFICANT LIFE EXPERIENCE:
EXPLORING THE LIFELONG INFLUENCE OF PLACE-BASED
ENVIRONMENTAL AND SCIENCE EDUCATION ON PROGRAM PARTICIPANTS

by

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Significant Life Experience: Exploring the Lifelong Influence of Place-Based Environmental and Science Education on Program Participants

Thesis directed by Professor Louise Chawla.

ABSTRACT

Current research provides a limited understanding of the life long influence of nonformal place-based environmental and science education programs on past participants. This study looks to address this gap, exploring the ways in which these learning environments have contributed to environmental identity and stewardship. Using Dorothy Holland’s approach to social practice theory’s understanding of identity formation, this study employed narrative interviews and a close-ended survey to understand past participants’ experience over time. Participants from two place-based environmental education programs and one science-inquiry program were asked to share their reflections on their program experience and the influence they attribute to that experience. Among all participants, the element of hands-on learning, supportive instructors, and engaging learning environments remained salient over time. Participants of nature-based programs demonstrated that these programs in particular were formative in contributing to an environmental stewardship identity. Social practice theory can serve as a helpful theoretical framework for significant life experience research, which has largely been missing from this body of research. This study also holds implications for the fields of place-based environmental education, conservation psychology, and sustainability planning, all of which look to understand and increase environmentally sustainable practices.

The form and content of this abstract are approved. I recommend its publication.

Approved: Louise Chawla
DEDICATION

To my child, nephews and niece:

May there always be for you wide-open spaces – places filled with nature’s wonders and an abundance of exploration in which you can freely, and with modest abandon, find out just who you are.
ACKNOWLEDGMENTS

I am forever grateful for and indebted to the community of support that has surrounded me throughout this entire endeavor. To my committee members, Louise Chawla, Willem van Vliet, Tori Derr, Bruce Goldstein, and Kevin O’Connor, thank you for your willingness to engage in this journey with me, for your insight, perspective, and challenge. I especially want to thank Louise for her tireless review of my writing, her ongoing encouragement, and her dedication to ensuring that all people have access to and a relationship with the natural world. I would be incredibly remiss to not thank the programs that participated in this study: Thorne Nature Experience, Wild Bear Mountain Ecology Center, and the University of Colorado’s Science Discovery. Without the support of the directors and staff, my ability to conduct this study would have been snuffed. To the participants of this study, thank you for letting me adventure back in time with you, reflecting on your stories of experience and the persons you are today. The words you shared form the foundation on which this study stands. An innumerable amount of thanks goes to my family and dear friends, who were always willing to provide me with perspective, encouragement, and comfort. To my four-legged children, Leo and Hitch, who were my constant writing break and hiking companions and whose tail wags and greetings always lifted my spirit. And to my husband, James, who bravely embarked on this journey alongside me. You are my greatest adventure.
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CHAPTER I

INTRODUCTION

The purpose of this research study is to better understand the long-term effectiveness and implications of informal place-based environmental and science-inquiry education programs for pro-environmental attitudes, beliefs and particularly, stewardship behaviors. This is currently a gap in research, largely due to the expense of longitudinal studies and the difficulty of tracking participants over time. This study presents an opportunity to explore the program experiences of past program participants, three to potentially fifty years since participation, in three distinct informal place-based environmental education and science-inquiry programs. This exploration is an attempt to understand the extent to which, if any, these programs have impacted participant identity in the form of environmental stewardship.

For the purposes of this study, I explore identity in terms of social practice theory which argues that “identities develop in the flow of practice,” influenced by cultural, historical and local forces (Holland, 2003, p34). In this way, I view social practice theory’s approach to identity as complementary to environmental stewardship which requires, in addition to environmental sensitivity, an element of action and continued practice for individuals who understand themselves as environmental stewards.

To explore these program experiences and their influence, I apply a significant life experience (SLE) approach as a means to frame my research question and to explore with study participants the perceived influence of their program. Significant life experience research explores formative life experiences that have shaped current adult attitudes, beliefs and behaviors through adult autobiographical memory and critical reflection. Past research has achieved this primarily through survey questionnaires or semi-structured interviews.
Significant life experience studies have not looked at the long-term impacts of specific environmental education programs on participants related to the influence such experiences have on environmental stewardship behaviors. This study looks to build on the existing, but limited, understanding of such program impacts as it relates to place-based environmental and science-inquiry education and was driven by the following question: When participants recall program experiences, what experiences remain salient to them and how do they understand those experiences to have shaped them over time, including but not limited to their environmental identity?

**Research Question**

This research study stems largely from an in-depth review of SLE and environmental education literature specifically exploring the connections between life experience, environmental attitudes and stewardship. What emerged from this literature review was a disconnect between the life experiences study participants attributed to adult environmental attitudes, beliefs and behaviors, and the mention of education. As such, I began to wonder why has existing SLE research found that environmental education has little impact on long-term pro-environmental attitudes and stewardship behavior, especially given the telos surrounding environmental education? This background question inspired the overarching research question, for this study explores past program participants’ experience of three separate and well-established place-based environmental education and science-inquiry programs located in Boulder County, Colorado. Thus, my research question is: When participants recall program experiences, what experiences remain salient to them and how do they understand those experiences to have shaped them over time, including but not limited to their environmental identity?
Additional guiding research questions for this study include:

1. Do participants believe these experiences influenced their environmental identity and stewardship behaviors? If so, how?

2. Is there a difference between nature-based and science-inquiry programs regarding formation of an environmental stewardship identity?

3. If career choice can be a reflection of identity in action, how were participants’ career choices shaped by the influence of these programs, if at all?

4. Does place play a role in the saliency of these experiences and their influence on identity formation over time?

In order to address these questions, I explored participants’ personal narratives as a way to understand to what degree these programs have been formative in shaping their life course. The theoretical lens through which I looked to understand the participants’ experiences is identity formation within social practice theory, which I will explore in greater detail in the Theoretical Framework section of this paper. I understand each of these questions to embody, at least in part, participant identity and the forces at play in identity formation over time. The approach for this research, while situated within the context of SLE research, is methodologically grounded within autobiographical narratives, and thus has a strong qualitative component. I also collected survey data, constructed from the findings of pilot interviews and past environmental identity scales, as a way to understand the broader effects of each program. However, given the low response rate for the surveys, which I will discuss in the Methodological Approach section, I elected not to include the survey questions as a major component of my analysis. I did use the survey responses and comments for additional illumination for the narrative interviews I conducted. I used the pilot interviews
to help guide the construction of the survey and when available, I used the survey to conduct follow-up interviews, wherein I explored survey participants’ program experience to gain a deeper understanding than could have been gleaned from the survey alone. I explore the methodological components further in the Methodological Approach section of this paper, but will first provide some general context and definitions I applied throughout the research process.

**Research Context**

Before moving further, I would like to provide some key definitions and context for what I mean by, and how I will differentiate between, place-based environmental and science-inquiry education. While not exclusively nature-based, Duffin, Murphy and Johnson (2008, p17) provide a description of place-based education (PBE) as “a holistic approach to education, conservation and community development that uses the local community as an integrating context for learning at all ages.”

While very closely related to PBE and often there exists little distinction between the two, place-based environmental education (PBEE) specifically explores the interactions of the natural and built environments and the ways in which human and natural communities are intertwined. As defined by the Environmental Education and Training Partnership (2010), “environmental education teaches children and adults how to learn about and investigate their environment, and to make intelligent, informed decisions about how they can take care of it.” Place-based environmental education takes this definition a step further to make explicit the connection to the local environment and need to understand its processes, inhabitants and influences first and foremost.
For example, PBE within an urban setting may look at the ways in which architectural structures influence neighborhood safety and explore the ways students can help improve their local neighborhood by interviewing local police, social workers and business owners. PBEE, on the other hand, would look at the ways in which urban architecture influences human behavior, such as walking, biking, driving or taking public transit, the impacts this has on local water ways and air quality, and the actions students can take, along with other community members, to measure and improve these environmental components. Of course, while PBE can include these components as well and often does, PBEE always includes a component that examines the ways in which the natural and human environments interact.

Science-inquiry education embodies science as an “active process,” that “learning science is something that students do, not something that is done to them” (NRC, 1996, p20). Science-inquiry is an approach to science learning or science discovery that requires both hands-on activities and “minds-on experiences” (p20). The National Research Council (1996, p23) provides a definition of science-inquiry that, while not concise, does articulate what the process of science-inquiry entails:

Inquiry is a multifaceted activity that involves making observations; posing questions; examining books and other sources of information to see what is already known; planning investigations; reviewing what is already known in light of experimental evidence; using tools to gather, analyze, and interpret data; proposing answers, explanations, and predictions; and communicating the results. Inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations. Students will engage in selected aspects of inquiry as they learn the scientific way of knowing the natural world, but they also should develop the capacity to conduct complete inquiries.

To the above definition, I would add an explicit component to science-inquiry is hands-on experience that “emphasizes knowledge construction and supports students doing science
rather than memorizing static facts and theories” (Kanter & Konstantopoulos, 2010, p857, emphasis added). Science-inquiry is often driven by students’ own questions, interests and exploration, encourages trial-and-error and challenges students to understand their errors and to make corrections based on their knowledge and available information.

Within this study’s research context, PBEE, as a subfield of PBE, can be differentiated from science-inquiry education in that it contains an explicit environmental and nature-based approach to hands-on learning of local natural communities. Often, PBEE also includes how these natural places are influenced by the built environment and human action. Science-inquiry education, while experiential, hands-on and often still place-based, does not necessarily contain an explicit element of teaching in and about the local natural environment or engaging in outdoor fieldwork. For the remainder of this paper, the above definitions will be applied to these two educational approaches.

While not always clearly explained or defined within SLE, PBEE or science-inquiry literatures, there does exist a distinction between formal, nonformal and informal education settings (Etling, 1993; Heimlich, 1993; La Belle, 1982). While it is possible for all three settings to occur simultaneously, it is important to understand the distinctions between each.

Formal education settings are those that take place within public or private schools, wherein there is an established teacher-student hierarchy, established curricula, grade level expectations, student evaluation and testing standards. This understanding of educational environments typically embodies what most people think of when referring to “school.”
While not as stringent as formal education, nonformal settings typically consist of extra-curricular activities that include a loose structure or lesson with goals and desired outcomes. La Belle (1982, p162) explains that “a major difference between the two processes rests within the deliberate instructional and programmatic emphases present in nonformal education but absent in informal education.” The learner determines the level of participation in nonformal settings and there is limited evaluation for students and generally no required or mandated testing standards. Organizations such as Scouts, 4-H, nature centers, and other extra-curricular camps represent nonformal educational settings, including environmental and science-based programs. While many programs outside of formal education might consider themselves to be “informal” learning environments, these programs would in fact fall under the more structured category of nonformal learning. As such, all of the programs explored within this study would fall under the nonformal category.

Informal educational settings are the most unstructured of the three and do not have any set agenda or lessons. People explore informal learning environments through their regular, everyday encounters with social and natural worlds. Informal learning embodies those spaces in which people learn from experience and exploration, often called lifelong or “incidental learning” (Etling, 1993; Heimlich, 1993). As mentioned early, these distinctions are very rarely recognized within much of the literature exploring these settings. However, to remain consistent with the definitions above, the programs within this study and the types of learning environments these programs foster will be referred to a “nonformal” education.

Before I move forward to the analysis and findings of this study, I will first provide a brief review of SLE, PBEE and science-inquiry literatures and what has been examined within
each field as it relates to environmental education and learning experiences. It is important to note that SLE research is not exclusive to environmental education, but has often been applied within the healthcare and education fields as well. For the purposes of this study, I have focused on the SLE research most relevant to my research interests, which largely remains within the field of environmental and place-based education research. I have also worked to identify what has not been explored and how the findings of this study can help to address that gap. I will present the context of this research study along with guiding questions, providing support for why these questions and study in particular are important and relevant particularly to the fields of place-based environmental and science-inquiry education and conservation psychology. From here, I will present the methodological approach that not only best suited me as researcher, but also my research questions. I will then explain my process for participant selection from each of the programs. I will follow the methodological approach with an explanation and background of the participating programs, including their individual history and mission statements. I will then present the analysis of the data and examine the findings, leading me to a discussion of both the limitations and implications of this study and its findings. I will conclude this discussion and study with reflections on the process, where the findings might direct practice, and the opportunity for future research and understanding.
CHAPTER II

LITERATURE REVIEW

Significant Life Experiences

What is known within SLE research as it relates to the natural environment is that many adults who have chosen environmental career fields such as environmental activism, conservation, or education, or who consider themselves environmental stewards, credit childhood experiences in nature for their current pro-environmental attitudes, beliefs and behaviors (Arnold, Cohen & Warner 2009; Cachelin, Paisley & Blanchard, 2008; Chawla, 1998, 1999, 2001, 2007; Chawla & Derr, 2012; Chawla & Flanders Cushing, 2007; Farmer, Chancellor & Fischer, 2011; Furihata, Ishizaka, Hatakeyama, Hitsumoto & Ito, 2007; Hsu, 2009; Palmer, 1993; Sward, 1999; Tanner, 1980, 1998; Thompson, Aspinall & Montarzino, 2008; Wells & Lekies, 2006). The breadth of childhood experiences that impact lifestyle decisions range from regular, everyday interaction with nature and the outdoors to a one-time outdoor adventure with an influential mentor or caregiver (e.g., parent, teacher, scout leader). Other findings reveal that participants also credit negative environmental experiences, such as witnessing a favorite natural area razed for housing or commercial development, as influential in career path choice, attitude and behavior. These experiences have often served as motivation to prevent such events from recurring (Chawla, 1998, 1999, 2007; Farmer et al., 2011; Furihata et al., 2007; Hsu, 2009; Sward, 1999; Tanner, 1980; Wells & Lekies, 2006).

Of particular interest relative to the influence of education, research findings also show that environmental and science education is one of the least credited significant life experiences in childhood and there is limited research that demonstrates that it has long-term impacts on
attitude, belief and especially behavior (Chawla, 1998, 1999, 2001, 2007; Chawla & Derr, 2012; Chawla & Flanders Cushing 2007; Farmer et al., 2011; Furihata et al. 2007; Hsu, 2009; Palmer, 1993; Tanner, 1980; Wells & Lekies, 2006). In my own participation at the 2012 North American Association for Environmental Education (NAAEE) Research Symposium, in a room filled with approximately 20 environmental educators, none of them credited environmental education for their current role in the field. Although small in number and anecdotal in nature, I believe this observation sheds interesting light on the field itself.

For example, Hsu (2009) conducted a study in Taiwan of environmentally active citizenry to explore which experiences they most attributed to their current attitudes and actions. Out of a total of 15 categories mentioned by participants, education was ranked last and was only mentioned once, or 3% of the time, by participants.

Furihata et al. (2007) conducted a SLE study in Japan, the first of its kind in the country, examining the SLE of 188 environmental educators compared to 25 community center patrons as a control. Among the environmental educators, the influence of school ranked seventh after nature experience, feeling loss of nature, family, books and media, profession, and social activities. For the control group, the influence of school and traveling tied for fifth. Interesting in their conclusion was the idea of “fundamental experiences” and “direct influences,” describing fundamental experiences as those “that form environmental sensitivity in childhood and youth” and direct influences as “the experiences that trigger environmental actions later in life” (p207). This finding echoes the findings of environmental sensitivity studies that suggest that sensitivity becomes a predisposition for action (Chawla, 1998, 2009).
Wells and Lekies (2006) surveyed 2,004 individuals, ages 18 to 90, in the United States using a closed-ended survey and when asking specifically about environmental education experiences, found that although there was some relationship between environmental education and attitudes and behaviors, this relationship was not statistically significant. They did limit the educational experiences question to “before the age of 11” and point out that “perhaps we have tapped into relatively structured modes of environmental education, rather than more engaging, hands-on versions that may be more likely to have long-term impacts” (p14).

Chawla (1998) conducted a thorough review of existing environmental sensitivity studies, revealing that within many of these studies, educational influences were rarely in the top three most significant influences. Often, the mention of educational influences was preceded by mention of outdoor play in nature, parents or mentors, and negative experiences. In her own study exploring the life experiences of environmentally-active citizens in Kentucky and Norway, Chawla (1999) found that education (e.g., junior high, secondary school, or university level) was mentioned by participants 38% of the time, following experience of natural areas, family, organizations, and negative experiences. Where school or educational experiences were mentioned, she notes that “most significant school memories featured opportunities to take action, rather than passive classroom learning” (p21).

Farmer et al. (2011) recently conducted a study on Indiana landowners who elected to place their land under a conservation easement, an agreement that places limits on development of the land and typically maintains the land as open space in perpetuity. The authors wanted to
understand the influences that led these landowners to enter into this agreement, particularly given the development pressures being placed on remaining open space in the United States (p341). The study, consisting of two phases that included qualitative interviews and questionnaires, found that among 62 questionnaire participants, environmental education was ranked 11th, falling in between “no impact” and “low impact” on the Likert-based scale. Of the 19 interview participants, education was not mentioned at all.

Tanner’s (1980) introductory study of SLE found that 31% of participants mentioned teachers as influential in environmental attitudes and action, preceded by parents, habitat and the outdoors. Of the 22 times these participants cited teachers, only three of these refer specifically to school programs and when mentioned, were “remembered as individuals rather than as purveyors of school programs” (p23). It seems to me that this finding might fit more appropriately under the category of influential mentors as opposed to educational influences and as such, education would have then been mentioned at a much lower rate.

There has been one recent exception to the influence of education on adult attitudes, beliefs, behaviors and career choice. The Nature Conservancy (TNC) (Zaradic & Pergams, 2011) commissioned a study on its Leaders in Environmental Action for the Future (LEAF) program which targets urban youth in environmentally-themed high schools based exclusively in the New York metro-area. The program began in 1995 and has continued to place students as TNC field site summer interns for 16 years. Out of 161 alumni contacted, 61 responded to the survey with the majority having participated in the program within the last seven years. This study did not preclude participants based on current career choice or knowledge of environmental activism, but were selected solely based on their participation in
the LEAF program. Many of the survey participants were non-white (85%) and the internship was, for most, their first long term experience in nature.

In addition to students gaining a sense of self-efficacy with regard to helping the environment and an improved sense of interpersonal and cooperation skills, 93.2% alumni reported becoming “more interested in environmental issues as a result of their participation” (p16). Additionally, 55% reported incorporating environmental practices or issues in their work. While 27% of alumni report a current occupation in an educational field, 11.5% reported a job in life, physical and social sciences which the authors state “includes jobs in conservation and environmental science” (p26). Additionally, when compared with the national average, LEAF alumni rank environmental issues significantly higher. And with regard to behavior, alumni reported behaviors “at rates equal to or higher than the general public for most measures of environmental behavior” (p35).

The results from this study are intriguing for several reasons, including the demographics of the population, the time since participation and the inclusion of urban youth from environmentally-themed high schools. The implications of this type of program are promising, with particular regard towards diversifying the environmental and conservation community. However, a limitation of this study, and one that is recognized by the authors, is the unknown potential influence of the high school curriculum. From what I understand of the survey, although comparisons were made with the national average, no comparison was made to students from the same high school who had not participated in LEAF. As such, it is difficult to know whether or not it was the TNC program that influenced
participants, the high school curriculum, or a combination of the two that reinforced the environmental focus of each.

While many of these research findings demonstrate the limited influence of education on existing environmental attitudes, beliefs and actions, the design of many of these studies did not include the explicit exploration of education as an influence. As a result, the reader does not know what about education was formative, if mentioned, and whether or not it was the individual teacher (although in some cases, teacher was mentioned explicitly) or the educational program. Is it because many of these participants did not participate in any kind of education, formal or informal, that included the study of the natural world, local ecosystem or the interactions between the natural and built environment? Or, did they have these experiences and they simply did not resonate, at least not significantly, as an influential, formative experience?

Tanner (1980), who largely pioneered and set the foundation for SLE in nature research, identified this as a primary purpose for studying SLE in environmental professionals: to increase and develop an environmentally active and aware citizenry. The findings from previous SLE research, however, suggest a gap in understanding the role environmental education has played in long-term stewardship behaviors.

**Place-based Environmental Education**

Environmental education programs center their mission on increasing awareness and pro-environmental stewardship among participants. The United States Environmental Protection Agency (2011) defines environmental education as “education that increases
public awareness and knowledge about environmental issues or problems. In doing so, it provides the public with the necessary skills to make informed decisions and take responsible action,” *action* being the primary goal of the knowledge sharing. Place-based education makes a strong case for influencing students’ sense of place, connection to nature, and role in their local community, suggesting it may play a hand in contributing to identity, and in particular, environmental stewardship.

Place-based and environmental education approaches are similar in their ability to integrate subject areas and include issues that “cut across many disciplines” (Skelly & Zajicek 1998, p580) and both often include elements of the other. Powers (2004, p17) states that PBE “has emerged from a 30-year foundation of environmental education,” and is often considered synonymous with terms such as environment as an integrating context (EIC) and sustainability education. For the purposes of this study, I include environmental education here as a way to explore how PBE can and often does integrate environmental and nature education. The studies I explore include elements of PBE with an environmental focus, for which I will use the term place-based environmental education, or PBEE.

Providing an environment that helps to create well-rounded citizens who understand community is certainly important. However, can the PBE environment help build communities that engage pro-environmental behaviors, act sustainably and affect environmental quality? Several studies have evaluated the effect of PBE, outdoor education and environmental education on students’ environmental attitudes, perception and subsequent behavior (AIR, 2005; Barratt Hacking et al., 2010; Bell, 2001; Blair, 2009; Chawla & Derr, 2012; Chawla & Flanders Cushing, 2007; Coyle, 2010; Duffin et al., 2008; Dyment,
2005a, 2005b; NWF, 2010; Powers, 2004; Rickinson et al., 2004; Skelly & Zajicek, 1998; Sobel, 2008; USPESD, 2010). Many of these studies have found that environmental awareness increases when learning is place-based, while impacts on environmental stewardship are uncertain and prove difficult to measure due to the limiting nature of self-reported data and inadequate access to longitudinal data. Gruenewald (2003, p8) argues that place-based environmental education, or what he calls “ecological place-based education,” can contribute to students becoming active and lifelong environmental stewards: “In order to develop an intense consciousness of places that can lead to ecological understanding and informed political action, place-based educators insist that teachers and children must regularly spend time out-of-doors building long-term relationships with familiar, everyday places.”

Several studies have found that PBEE has a positive effect on children and youth’s environmental sensitivity. Skelly & Zajicek (1998) found environmental education through school ground gardening increases elementary students’ environmental connection, awareness and sensitivity. In her review of studies exploring learning outside of the classroom, Malone (2005, p22) found that children and youth possessed a “heightened sense of environmental responsibility” and “enhanced feelings of tolerance, nurturing, resilience and empathy” when they had actively engaged with a particular natural site, such as a park or wilderness area, for an extended period of time. It should also be noted that Malone’s (2005) review had similar findings with museums and art galleries with regard to students’ increased sense of appreciation. This finding suggests the importance of providing learning opportunities outside the classroom and within the community as it builds a sense of relevancy and relatedness to students’ lives.
A few studies have been able to demonstrate actual change in environmental quality, which could provide indirect evidence for an increase or change in environmental stewardship. Duffin et al. (2008) conducted a study exploring the implications of PBE or “place-based learning” on environmental quality, specifically air quality, among 54 environmental education programs throughout the United States. This study discovered that programs employing the core qualities of PBE within their program saw a measurable change in environmental quality in terms of physical and proxy quality. Physical quality of the environment was considered to be environmental qualities that could be measured, like particulates and other gases. These measures were taken on indoor air quality. Proxy quality was recorded for measures that were based more on observation of change, such as removal of bus and car idling. The authors found a measurable improvement in both physical- and proxy-based air qualities. Students participating in these programs not only improved air quality and respiratory health, but also came away from the experience with a greater environmental awareness and sense of empowerment with regard to environmental issues. These findings were self-reported by the study participants and were based on a one-time survey report, limiting the implications for understanding long-term improved environmental quality and environmental stewardship among participants.

What is so unique about this particular study, is that prior to its findings, PBE and environmental education supporters were hard pressed to show that these educational programs had any kind of impact on the environment, not to mention long-term behavior changes in students. This study sets the stage for additional research in this area that could explore other quantifiable impacts, such as water quality and energy consumption, which is arguably an indirect measure of climate change factors. Duffin et al. (2008) demonstrate that
PBE programs, when integrating the local community and natural environment, can have a positive impact not only on the student, but also on local environmental quality and community health.

Similarly, Chawla and Flanders Cushing (2007) reviewed existing research exploring the links between environmental education and stewardship behaviors. Based on their review, they suggest that when educational approaches are coupled with age-appropriate tasks, children and youth can become more invested in their local environment by becoming engaged citizens, empowered through a sense of self-efficacy and cooperative group efficacy, particularly as it relates to the realized potential for social justice and environmental change. In other words, when students feel that their personal and collective efforts can actually lead to change, they are more likely to become engaged community citizens committed to improving local environmental quality. Barratt Hacking et al. (2010) had similar findings in their assessment of schools in the United Kingdom that integrated sustainability, through physical school ground greening and/or use of the environment as an integrating context within the curriculum.

Silo (2011) echoes these findings in her case study of a rural school in Botswana employing environmental education though local waste management. Through a collaborative learning environment that engaged both teachers and students, while remaining sensitive to the tensions that arose through local cultural and historical activity, children developed a sense of both collective and action competencies. Stanley (2011) articulates well the life-long, life-wide and life-deep transfer of competence and sense of efficacy that can be, and is often, established through PBE. “The development of competence in one place can lead to
carrying that place and its lessons with us when we move on, which is ultimately the promise and fulfillment of experiencing the good life in childhood” (p208).

Kahn (2003), Moore and Cosco (2000), White (2004) and Louv (2005) advocate for the importance of exposing children to nature at an early age to not only foster optimal development, but to also establish a positive relationship with the natural world. They argue that prioritizing this relationship is necessary to work against “environmental generational amnesia” (Kahn, 2003) in order to build a more “earth-bound culture” (Moore & Cosco, 2000) of children who will become “stewards of the Earth” (White, 2004): that is, a culture which will remain dedicated to caring for and ensuring the sustainability of life lived on and in partnership with Earth.

In his conversation on the conservation of the natural environment, Aldo Leopold (1949, 1966) questions the quality of education as it related to the environment:

Conservation is a state of harmony between men and land. Despite nearly a century of propaganda, conservation still proceeds at a snail’s pace; progress still consists largely of letterhead pieties and convention oratory [...] the usual answer to this dilemma is ‘more conservation education.’ No one will debate this, but is it certain that only the volume of education needs stepping up? Is something lacking in the content as well? (p243, emphasis in original).

The progress our culture has made regarding environmental stewardship and education is echoed in a text more than 60 years old. The question still remains: can PBEE have a positive influence on the day-to-day lives of its students? Based on the literature reviewed above, there is evidence to suggest that such programs can and do have a positive influence on students’ environmental stewardship, at least in the short-term. But what are the implications of such programs over the life course of former students and do they reflect on
those programs when taking action on behalf of the natural environment? My interest in this question drives this overall exploration of former students’ experience to shed light on such implications and the role these programs have played in students’ current understanding of self, the natural environment and their situated place within that context.

**Inquiry-based Science Education**

Similar to the findings within PBEE, science inquiry or inquiry-based science education has found that when students can engage with science in a way that is student-directed, hands-on and relevant, their experience with and understanding of the content exceeds traditional models of direct instruction. This approach to science learning also has the potential to positively increase students’ attitude towards science and their ability to identify with science fields in general.

Research on inquiry-based science education has found that hands-on learning, when combined with appropriate technologies, is beneficial to building student knowledge and understanding of science concepts (Geier et al. 2008; Krajcik, McNeill & Reiser 2007). As demonstrated from the literature reviewed above, environmental education, often an extension of natural sciences-based inquiry, has been demonstrated to be effective in making environmental science a tangible and relevant learning experience for students, particularly when the element of place and the exploration of the local are involved. This effectiveness extends into general science-inquiry as well.

Gruenewald (2003, p8) touches on the need for a balance in students’ education, citing the benefit of the classroom environment and the simultaneous need to reach beyond the
classroom walls: “Though it is true that much significant and beneficial learning can happen here, what is most striking about the classroom as a learning technology is how much it limits, devalues, and distorts local geographical experience.”

Stanley (2011) explores how recess access to adjacent school woodlands increases children’s desire to explore the possibilities and wonders of nature, bringing inquiry and excitement back into the classroom. Stanley found that children enter into a mutual understanding of shared space when playing in the school woods, sharing their imaginations, discoveries and explanations for things uncovered. Elementary school children of varying ages engaged in the woods together, unlike the typical stratification that takes place on fixed-structure playgrounds. She claims the importance of the school ground in developing a sense of place and the influence that child-directed play can have on children’s engagement in the classroom as well. “If we expect children to acquire the environmental lessons that will be the most meaningful for them, we need to take careful note of which aspects of a place they gravitate to” (p208). Through a supportive classroom environment, these children were more willing to engage in science exploration because they could draw a direct line between what they were learning in the classroom and what was relevant to their world.

Yunker, Orion and Lernau (2011) found that when formal science curriculum was integrated into locally-based educational experiences, students retained more accurate curriculum-related concepts when compared to students whose curriculum was not integrated. Their study explored two classrooms within the same school in Israel, comparing how the fourth grade and sixth-grade field trip to an historical, hands-on museum site impacted students learning and the staying power of that experience. The fourth grade class, whose fieldtrip
integrated the curriculum into the site experience, was able to more accurately recall details of the historical site and the history of its use months after visiting the site when compared to the sixth grade class. The sixth grade fieldtrip did not integrate the site history into the curriculum and the field visit served more as a recreational excursion than a learning opportunity.

Gibson and Chase (2002) conducted a longitudinal study of middle school students’ attitude towards science after participating in a two-week long inquiry-based science summer program. The study compared three groups of middle school students: those who had applied and were selected for the summer camp; those who had applied and were not selected for the summer camp; and those who attended the same school, but had not expressed interest in the summer camp. While students who participated in the summer program already possessed an interest in science, as did their counterparts who were not selected, the study found that program students were more likely to maintain their interest in science over the years. Follow-up interviews indicated that students expressed greater interest in science when it was made relevant to their own lives.

An interesting finding of the study, which the authors state is consistent with other research findings, was that all students’ interest in and attitude towards science decreased from middle school to high school. The authors explain this as a transition from inquiry-based science to more traditional “cook-book” methods of science education in high school. The findings of this study point to the influence of hands-on, inquiry-based science learning and the role it may have in increasing students’ positive attitude towards, and identity with, science in general. It also illuminates the importance of repeated and reinforced experience within
similar science-inquiry settings. While the study did track students over a period of four years, it did not track students beyond high school, limiting the long-term understanding of such experience on academic and career choice and overall identity within science fields.

Similarly, Bartley, Mayhew and Finkelstein (2009) found that after-school informal science education programs positively influenced elementary students’ attitudes and interest in science. Their study suggests that informal learning environments are less constrained than formal ones and may create an increased opportunity for students to explore science in a supportive environment. The authors discuss the value of this as it relates to “opportunities to cultivate science excitement and support the identities of children as contributors to science” (p93). While this early exposure to science certainly has value in and of itself, it is difficult to know the extent to which such programs will or can support children and youth throughout their educational journey.

Sterling, Matkins, Frazier and Logerwell (2010) found that when underserved middle school youth participated in a science-inquiry summer camp that used problem-based learning and student experience as the basis for exploration, students’ attitude towards science and their knowledge of science increased significantly. Students felt more empowered by the knowledge and skills they gained through the two-week long camp experience and were given the opportunity to interact directly with practicing scientists. This opportunity allowed students to see the application of science in the real world, while becoming aware of the “commonalities that exist between themselves and the scientists they met” (p141). This experience, if reinforced later on, has the potential to increase students’ positive attitude
towards science and influence their ability to identify with and place themselves within the context of various science fields.

Archer et al. (2010) conducted a study with 10- and 11-year old children, exploring what factors play into how children decide that science is, or is not, for them – and, they approach this exploration through the process of identity formation. Their application of identity helps to explain the ways in which identity and self-perception can “profoundly shape individuals’ educational choices and trajectories” (p619). Their exploration of children’s experience with and explanation of science looks to differentiate between “doing” science and “being” a scientist; their evidence suggests that “increasing a pupil’s enjoyment of ‘doing’ science will not necessarily translate into their uptake of a science identity” as there are many factors that contribute to or prevent such uptake (p623). While the children’s voices speak to the type of science they are doing in the classroom, the authors do not necessarily touch on how a more hands-on, inquiry- and place-based approach might increase students’ thoughts of “being” a scientist. What I appreciate most about this study is the explicit intent to include the complexities of identity in learning environments and the role identity formation plays in how children and adolescents make early decisions about their future selves.

The exploration of this literature strongly suggests that when students are given the opportunity to engage in science learning that is hands-on, place-based and relevant to their own lives, the potential for students to not only succeed within science fields increases, their ability to identify with and understand themselves as a part of that community can also increase. I have also begun to wonder in what other ways do students benefit from such
experiences that extend beyond the context of science. As it relates to this particular study and the exploration of environmental identity more specifically, can such experiences lead to an overall increased awareness of the world around them? If so, can this awareness increase the possibility of program participants possessing an environmental stewardship identity? While these inquiries extend beyond my general guiding questions, I hope to touch on these through the shared stories and experiences of this study’s participants.

**Theoretical Framework**

As previously mentioned, SLE research looks to explore the life experiences of individuals or groups of people and how those experiences have shaped the people they have become. Much of SLE research conducted on formative experiences of environmentally-oriented professionals has collected these experiences through closed-ended surveys, focus groups, or semi-structured interviews that solicit from participants the experiences they most attribute to shaping their career choice and pro-environmental behaviors. The often open-ended, discussion-based nature of these focus group and semi-structured interview studies are essentially a form of narrative inquiry, a research process through which participants share their lived experience and reflect on the influences of those experiences over time.

Narrative is often described as the practice through which people make meaning of the experiences in their life and how those experiences have shaped who they are and who they hope to become (Elliot, 2005; Webster & Mertova, 2007). As explained by social practice theory, this sense making is often a reflection of the socio-cultural location of individuals and the reflected meaning is a mirror-image of access to and knowledge of historical, social, and cultural understanding (Hargreaves, 2011; Holland, Skinner, Lachicotte & Cain, 1998;
Holland, 2003; Kitchell, Kempton, Holland & Tesch, 2000). This suggests that narrative is a process through which individuals can understand personal identity and those experiences that over time have influenced identity formation: “The ability to form narratives therefore enables an individual to organize his or her experiences in a way that provides that individual with a sense of him- or herself as an intentional agent with continuity through time” (Elliot, 2005, p 126).

Holland et al. (1998, p5) describe identity as “a concept that figuratively combines the intimate or personal world with the collective space of cultural forms and social relations.” Similarly, “the narrative constitution of identity” considers not only socio-cultural situating, but also a temporal understanding, that as we move through time, our narrative understanding may also shift and adjust through additional experiences and reflection (Elliot, 2005, p124). Holland (2003) uses social practice theory to explain this concept of identity formation and Holland and Lave (2001, p19) explain that the evolving narrative of experience results in a “thickening” of identity. In a separate study, Holland (2003, p31) elaborates on her and Lave’s work, explaining this thickening as a process of repeated practice in a particular cultural world that is made up of persons who possess “particular characteristics and states,” engage “in significant acts toward the world and one another,” and are motivated “toward particular ends.” Holland also contends that “persons form as many identities as the cultural worlds in which they become deeply engaged,” embodying the social practice theory’s understanding of identity as a culmination of multiple identities (p32). The sharing of narrative can then be thought of as an articulation, expression and understanding of this perceived personal identity as it has been formed through practice and over time.
Similarly, Webster and Mertova (2007, p2) state that Carr (1986) “argues that action, life and historical existence are themselves structured narratively, and the concept of narrative is our way of experiencing, acting and living, both as individuals and as communities, and that narrative is our way of being and dealing with time.” Elliot (2005, p125), summarizing Ricoeur’s work on narrative and identity, uses the term “selfsame” to explain how our identities are dynamic throughout time: “identity as permanence through time without sameness through time.” She goes on to state that “the narrative constitution of the self suggests that subjectivity neither is an incoherent stream of events – a sense of life as ‘one damned thing after another’ – nor is it immutable and incapable of evolution” (p125).

Holland (2003) understands identity to be a function of cultural and historical influences on the individual and the interactions of these influences in the self with the outside world. Her work embraces the idea of multiple identities within the individual and that there always exist these multiple identities within each of us (e.g., child, parent, employee, mortgagor, dog owner, nature lover, etc.). What I find particularly insightful from Holland is her understanding of the role of place: “dilemmas of orchestrating multiple identities are ignited by and deeply shaped in local practice” (p47). In addition to the way that Holland’s articulation of social practice theory illuminates identity formation and narrative, I expect this concept of place to help me further understand the influence of place – Boulder County, Colorado – on these programs and the study participants. While place is not the primary focus of this study, I believe it is an important factor to, at the very least, acknowledge its potential role in identity formation. As I will further explore in the analysis section of this study, the participants who shared their story of experience revealed that place has played and continues to play as a factor in identity formation and overall program experience.
What we make of the situations and tools given us invariably shapes who we become, a process that is reflective of our inner nature and our outer life world. In her work examining the multiple identities of individuals as both hunter and environmentalist, Holland (2003) discusses how the history in person (i.e., the things that have shaped us over time in our lives, including our culture, and the things that have shaped the culture in which we exist) regularly come in contact with historically institutionalized struggles and how those struggles interact with local practice. Our identities are therefore constantly being challenged in this way and the ways in which we view these respective struggles or interactions influence our evolving self-identity.

Holland’s discussion of identity in this way, the subtle or sometimes overt push and pull of everyday influences, echoes Gadamer’s (1975/2004) concept of a “fusion of horizons.” That is, each of us possesses a certain viewshed, or horizon, of the world – our personal understanding of the world and reality as shaped through our historical and cultural experiences. Gadamer further explains that in sharing our understanding with others, and vice versa, our viewshed is expanded as we come to understand the world through both our experience and the experience of others, resulting in a fusion of horizons. This is to be understood not only as the world acting on us, but also our interaction with the world – again, an interaction between the outer world and our inner nature. Clayton and Myers (2009, p55) argue that “identities are experienced both internally and externally: we have a self-concept or sense of ourselves, but we are also defined by others.” However, Seidman (1998, p3), who was heavily influenced by the work of Schutz (1967), summarizes Schutz’s stance on this possible fusion of understanding:
[..] it is never possible to understand another perfectly, because to do so would mean that we had entered into the other’s stream of consciousness and experienced what he or she had. If we could do that, we would be that other person.

Seidman (p3) continues that although there are limitations placed “on our understanding of others, we can still strive to comprehend them by understanding their actions.” I summarize these perspectives here because I view them as having a common thread in how identity is woven and formed throughout life. I think each perspective helps to illuminate the other and as such, has helped me to better understand the process through which identity comes to exist. This study is an effort to comprehend participants’ experience through their own articulation of experience, helping me to understand the extent to which this experience shaped their current identity in action.

Furthering this, Holland’s work with identity as hunter and environmentalist suggests that the fusion of horizons is not a given; that is, required in this fusion or expansion of understanding is an element of relatedness between story-teller and listener. Elliot (2005, p127) argues that “focusing on the importance of the context and the audience for the performance of a narrative acts as a reminder that our ‘self-narratives’ must be supported or at least tolerated by those around us.” The sharing of narrative either through everyday conversation or as an interview research process has the potential to expand the interviewer and interviewee horizon within a co-constructed space that explores the meaning of experience and its inherent shaping of identity. Throughout the process of allowing participants to share their narrative, I made every effort to remain sensitive to this understanding of co-construction during both the sharing and analysis of their story.
The process of narrative is a process of meaning making through personal storytelling. It requires critical reflection on the lived experience. Elliot (2005) explains that “narrative fits with this conceptualization of identity as ‘selfsame’ in that it provides the practical means by which a person can understand themselves as living through time, a human subject with a past, present, and future” (p125). Rarely do most people daily reflect on their identity and how their identity has been formed through historical, cultural and place-based influences. Maybe we do this when something or someone significantly challenges our identity, positively or negatively, asking questions: Does this challenge resonate with my understanding of who I am? Does it suggest an identity that I do not associate with? Do I want to associate with this identity? What do I need to do to enhance or remove this perception of my identity? The narrative process provides the opportunity to pause and reflect, to examine and reexamine our experience and the influence we understand it to have had on ourselves. In the spirit of this process, I constructed and employed the interview follow-up questions (Appendix B) to be reflective of the varying influences on identity, asked in such a way that aimed to use comfortable and comprehensible language for the participant. In using narrative interviews to explore participants’ experiences, I believe it is imperative for me as researcher to understand the possible factors that influence participants’ understanding of experience and the influence of that experience, if any, on their lives.

Of particular interest to this study’s exploration of environmental stewardship through education, Holland (2003) and her colleagues (1998) explain identity not just as an understanding of self, but as action. “Indeed, we begin with the premise that identities are lived in and through activity and so must be conceptualized as they develop in social
practice” (Holland et al., 1998, p5). Environmental stewardship communicates sensitivity towards, and action for, the environment. Chawla (1998, p19) explains environmental sensitivity as “a predisposition to take an interest in learning about the environment, feeling concern for it, and acting to conserve it, on the basis of formative experiences.” Sensitivity is transformed into stewardship when this predisposition steps into action and continued environmental social practice.

This is where I see Holland’s theory of identity through social practice explaining how individuals come to identify themselves as environmental stewards. It is important for me to note here that I did not expect these educational experiences to be the reason for constituting environmental identity and as their stories reveal, it was not the single influence of place, educational program, or age of participant, but a multitude of interactions and events that have shaped participants’ understanding of experience. I understand the process of narrative as a way to explore participants’ experience and the influence of such experience on identity. Throughout the course of this study, I have paid particular attention to the influence, if any, of educational experience on environmental stewardship identity. In the following section, I hope to articulate my understanding of how environmental stewardship, if present, is a part of participant identity and invariably, one of multiple identities.

The Connection Between Environmental Stewardship & Identity

Often, our actions, attitudes and beliefs are an expression of our self-identity. And while our identities may not always be clearly accessible to us as is a book on a shelf, we do possess, at the very least, a sense of who we are. Chawla (2001, p457) explains that “although we probably do not have complete self-understanding of our actions, neither, I believe, are the
reasons for our actions usually completely opaque to us.” Clayton and Myers (2009, p59) explore a variety of terms in existing literature that explore environmental identity and argue that while these terms may not be identical, “they all stem from the idea that the natural environment and our relationship to it can be an important part of our self-concept.”

Holland (2003, p34) explains “that personal identities develop in the flow of practice” and that “having a well-formed identity means that an actor has a relatively enduring, albeit open ended, sense of herself, which she can use, at least in a modest fashion, to organize herself in practice.” She goes on to explain that in addition to one’s attitude and beliefs, this understanding of identity allows the individual to act according to that identity and to care how those actions are perceived by others. Exploring environmental sensitivity and action, Holland (p34) explains that in terms of identity:

[…] sentiment becomes significant for sustained and generative environmental action only when it is transformed into a sense of self to which one is emotionally attached. In other words, we distinguish between unorganized environmental sentiment and that which has been fashioned into an identity. The latter is more important than the former as a basis for agency and action.

This idea is supportive of findings within SLE literature and studies exploring environmental behaviors. While behavior and action are not always a reflection of attitude, beliefs or even knowledge, when environmental action does occur, individuals often express an emotional attachment that is empowered through both knowledge and sense of self-efficacy. Chawla and Derr (2012, p528) articulate well this connection between action, sentiment and identity:

People are drawn to act because they come to care for intrinsic qualities of nature, particular places, or the well-being of people who are affected by the environment, because they internalize social norms of environmental responsibility, and because they develop an identity of connection to nature.
For the purpose of my research, I explored how these informal educational experiences may be a part of former students’ development of an identity of care and connection to nature. Concern has been raised for the limited opportunity afforded by these programs, primarily through their limited extent of time, and the overall influence this limited experience could really have. It is true that much of SLE research found that regular experiences with the natural world were most influential in driving environmental sentiment, activism, and/or career choice. My aim, however, was to understand the range of experiences, regardless of time spent in the program. While I did not select participants based on their repeated experience with the program, most participants (20/21) within this study reported repeated participation in these programs over multiple years and often multiple times within a year. This raises an interesting note regarding program experience that while SLE literature does not rule out the influence of one-time experiences, it may be that participants who only attended one program for one summer may not have been impacted in any significant way. Because the participants in this study were repeat program participants, I was not able to explore this question within the context of this study. This study’s participant response is limited to repeat participants and reinforces previous studies’ findings that regular and repeated experiences are more likely to play an influential role over the life course.

Few SLE studies, however, have asked explicitly about the role of educational experiences, and in particular, informal educational experiences in environmental sensitivity or stewardship. Palmer (1993) explored the formative life experiences of environmental educators and while 59% cited education as a major influence, Palmer did not ask specifically about education stating that participants were asked “to state what they considered to be their most significant life experience” (p27). Wells and Lekies (2006) did ask about
educational and program experiences prior to the age of 11, with 60% of respondents reporting some form of informal nature or environmental education experience. The effect on adult environmental attitudes and behaviors was found to be non-significant.

Additionally, no SLE study that I am aware of explicitly discusses the formation of identity and stewardship as identity. This study has served as a unique opportunity to explore the impact of informal, hands-on, inquiry-based education programs on participants. What these programs afforded to past participants was an opportunity to informally engage with their world through discovery and exploration, not confined by curriculum standards or test pressures and children were encouraged to have fun with the interesting components of their world, “messing about in science” (Kellogg, 2010, p61). James, Bixler and Vadala (2010, p250) explain that “even when a person reports a single memorable, peak or pivotal experience, it is most likely that many valued and varied experiences prepared the person for whatever revelation occurred.” The process of narrative that I employed with each participant provided an opportunity to explore these “many valued and varied experiences” to shed light on why one experience or the combination of several proved impactful.

This study serves as an exploration of experience, as I did not know ahead of this study whether or not these programs influenced identity, much less environmental stewardship. The aim of this study was to be sensitive to individual experience and what each participant attributed from their past to their current state of mind and action. Chawla (1999, p25) explains that “in life paths, individual interests and abilities interact with personal circumstances and historical opportunities and constraints.” Certainly, individual interests, a predisposition or affinity for the outdoors or rocket building, served as an important
consideration and for certain participants, proved to be a contributing factor as to whether or not these experiences resonated with them. Prior to initiating this study, I viewed the process of narrative interviewing as a good way to get at these experiences and the level of significance they hold in participants’ lives; conducting the interviews reinforced this perspective and proved to be a valuable and enjoyable approach to exploring experience. Exploring participants’ experience through the lens of social practice theory helped me to additionally shed light on how, through varied experience and practice, identities are formed. I applied my understanding of this as a means to understand the formation of environmental stewardship as a part of participants’ identity.

**Methodological Framework**

**Narrative-based Interview**

Scheibelhofer (2008) identifies narration-based interviews as the in-depth interview, the narrative interview and the ethnographic interview. As a general rule of thumb, the narration-based interview technique allows for the research participant to lead the direction of the interview following a loose prompt, while the researcher may ask questions for clarification or deeper probing, as is the case with in-depth interviews. The narrative interview typically begins with a topic prompt and then allows participants to share their story, their lived experience, uninterrupted as they remember it. I viewed this approach, as opposed to more structured question-and-answer interview, as helpful in eliminating researcher bias or leading questions, which is often a critique of psycho-social research aimed at exploring experience (Clarke & Hoggett, 2009; Elliot, 2005; Scheibelhofer, 2008).
Similarly, Seidman (1998, p9) uses a type of interviewing he calls “in-depth, phenomenologically based interviewing” with an approach that employs “primarily, open-ended questions.” He goes on to explain that the interviewers’ “major task is to build upon and explore their participants’ responses to those questions. The goal is to have the participant reconstruct his or her experience within the topic under study” (p9). In this approach, Seidman (p11) proposes a three-interview series aimed to: one, understand “participant’s experience in context […] in light of the topic up to the present time;” two, focus on the “details of the participants’ present experience in the topic area;” and, three, “to reflect on the meaning of their experience.” There is certainly strength and value in using this three-interview series approach, but this approach presented potential limitations in its requirement of time and commitment on behalf of the participant and transcription and analysis on behalf of the researcher. The approach I took within this study was similar in its aim to understand experience and its meaning. Because the participants participated several (or many) years past, discussing participants’ present experience with the program was not necessarily relevant. However, many of the younger participants remain actively involved with their respective program, which I believes speaks to the influence their experience had.

As explored in detail in the Theoretical Framework section, I understand narrative to be a process through which life experiences can be explored, revisited and reflected on. I also understand narrative, through this process, to be a way to contemplate how those experiences have shaped individual’s identity in practice. While the survey portion of this project aimed to explore this too through closed-ended questions, the process of narrative interviewing specifically allowed the individual voice and experience to shine through. It is this voice and experience that I was particularly interested in and I believe provided the most
insight into the saliency of these experiences and how these experiences are viewed to have shaped the individual. Without the narrative process of this study, it is clear to me that I would have missed a substantial portion of participants’ experience and the often indirect influence it played in their lives. No doubt the narrative process and the sharing of stories has resulted in richer and deeper exploration of experience. Seidman (1998, p3) points out this about the interview process:

The purpose of in-depth interviewing is not to get answers to questions, nor to test hypotheses, and not to ‘evaluate’ as the term is normally used. At the root of in-depth interviewing is an interest in understanding the experiences of other people and the meaning they make of that experience.

I used the narrative-based interview approach for the pilot interview and it proved to be an effective process for this study and my research questions. Seidman (1998, p32) discusses the importance of piloting a proposed study, as it helps researchers “learn whether their research structure is appropriate for the study they envision.” The interviews, both pilot and follow-up, lasted anywhere from 30 to 90 minutes, and as the interview progressed, participants seem to settle into their story, becoming more relaxed, often elaborating on the meaning of their experience without much prodding from me. All interviews were audio recorded and later transcribed, giving me as the researcher the opportunity to experience the interview stories in multiple and repeated forms.

In this next section, I will outline the methodological process I used to conduct this study, why I chose the programs that I did and how this process allowed for greater insight into the influences of these educational experiences on participants’ lives.
CHAPTER III

METHODOLOGICAL APPROACH

Initially, I proposed to employ a mixed-methods approach to co-exploring autobiographical memory with past PBEE and science-inquiry based program participants through narrative interview and survey methodologies (Elliot 2005; Johnson & Onwuegbuzie 2004; Scheilbelhofer 2008). In this section, I will explain how this approach necessarily evolved over the course of the study to best fit the data I was able to collect. I will provide a brief background for the study and study sites; the study location and the role of place; an overview of participants; the study approach, including each method of data collection; and, how I analyzed the data based on the methods used and how this approach was conducive to evaluating experience.

Study Background & Study Sites

The three programs with which I worked, Thorne Nature Experience (formerly known as “Thorne Ecological Institute” and from now on referred to as “Thorne”), the University of Colorado Science Discovery (CUSD), and Wild Bear Mountain Ecology Center (Wild Bear), were selected because of their institutional history within Boulder County: over 56 years, 23 years, and 17 years, respectively, and because of their nonformal education approach to nature and science learning. Each of the program’s histories is presented in the following chapter.

While each program has an nonformal science-based approach, Thorne and Wild Bear have an explicit place-based environmental and nature education approach. Thorne’s mission statement reads as follows: “Founded in 1954, Thorne’s mission is to build Earth
stewardship by connecting youth to nature through joyful, hands-on, place-based environmental education experiences’’ (Thorne Nature Experience, 2012). Similarly, Wild Bear's (2012) mission statement reads: “Since 1995, Wild Bear's mission is to provide year-round educational programs to people of all ages fostering a life-long appreciation of the environment and promoting an environmentally aware and ecologically sound community.”

The CUSD program, on the other hand, provides programs primarily in STEM (Science, Technology, Engineering and Mathematics) education (e.g., physics, chemistry, biology, astronomy, geology, engineering). The CUSD (2013) mission statement reads as follows:

CU Science Discovery’s mission is to heighten interest and increase literacy in science, technology, engineering and math (STEM) by providing hands-on experiences that connect students and teachers to current CU science. Science Discovery capitalizes on CU-Boulder’s scientific resources, facilities and expertise to excite students about STEM, expose them to a variety of STEM careers and professionals, and inspire a future generation of scientists and engineers.

These three programs offer a cross-section of past participants from their decades of programming, a comparative analysis between PBEE and science-inquiry education, and the potential effects each programmatic approach carries. In my attempt to understand the formation of environmental stewardship behaviors, the exploration of these types of programs has helped me delve in to what degree environmental and/or science education programs influence lifelong pro-environmental awareness and stewardship behavior.

In conducting the SLE literature review and having become familiar with Thorne over the past couple of years, I was interested in exploring Thorne’s past participants because of Thorne’s specific focus on place-based environmental education that includes hands-on, engaging exploration of local flora and fauna. Thorne's approach to teaching allows children
time to not only learn about new ideas and concepts, but to also explore these concepts tangibly and on their own through informal learning and play in nature. Wild Bear’s approach to learning is similar to Thorne’s in that it explicitly seeks to connect children to their local natural environment in an effort to promote environmental stewardship. This type of child-directed exploration has been found within the SLE literature to be one of several frequently cited experiences contributing to adult environmental attitudes, beliefs and behaviors.

For the purposes of understanding the influence of these PBEE programs on environmental identity, I needed an established comparison program that also provided nonformal education experiences, but whose focus and mission was not based solely on fostering environmental awareness and stewardship. CUSD, given its longevity in the community and its explicit STEM focus, was selected for this purpose. It provides hands-on science learning in a nonformal educational setting, but does not necessarily link this learning to the local natural community. I wanted to be able to shed light on whether or not programs like Thorne and Wild Bear are reaching their mission of promoting environmental stewardship and how such programs compared to other nonformal learning environments. As such, the aim of this study is consistent with the call of Farmer et al. (2011, p347) for future steps in research: “research that considers adults who had the opportunity to participate in the multitude of formalized environmental programs as youth will allow for clarity on whether these programs are as successful as their informal counterparts.”
Study Location & the Importance of Place

In an effort to understand the role of place within these experiences, I felt it was important to draw experiences from participants of programs that exist within a geographical boundary: in this case, Boulder County, Colorado. Acknowledging that places within Boulder County can and do differ greatly and may contribute to variation of experience (e.g., City of Boulder vs. City of Longmont, Lafayette or Louisville), Boulder County and the programs within it are unique in comparison to other Colorado counties and states. From a methodological standpoint, I had concern that comparing programs from different locations would present too many unknown variables and would not allow for a methodologically-sound program comparison. Limiting the study population to one general geographical area has provided a better opportunity to understand the role this place in particular plays in stewardship. Place can have a particularly powerful effect on people’s perception, identity, attitudes, beliefs and behaviors (Farmer et al., 2011; Holland, 2003; Latham, 2003; Evans & Jones, 2011). Additionally, in consideration of both time and my capability, this approach remained within the scope of this particular study.

While several of the past program participants of each program have since moved out of Boulder County, it was important to me to consider how time spent in Boulder County could have contributed to the general life experience of individuals. Boulder County, and the City of Boulder, Colorado, are unique locations geographically, ecologically and socially when compared to the state of Colorado and other states at large. Located at the foothills of the Rocky Mountain Range, the City of Boulder as a place is an ecological and geographical confluence of mountain terrain and the Great Plains. Visually, it is a place that seems to command at the very least acknowledgement of the natural world. Nederland, Colorado,
which serves as the home-base for Wild Bear’s program, is just as unique and arguably more liberal and free-spirited than the City of Boulder. While still within Boulder County, it is located up the canyon, west of Boulder and is situated just east of the continental divide. Many of the students who participated in Wild Bear grew-up in Nederland and were thus shaped by the small mountain-town dynamics that exist. In casual conversations with Ned locals, it became quickly apparent that they readily differentiate themselves from Boulder and it is by proclaimed choice that they live where they do.

Socially, Boulder County has served, or attempts to serve, as a model to other counties and municipalities around the country for how to protect and effectively conserve open space and natural resources. Often noted for its exclusivity based on housing cost and overall population density due to this very conservation strategy, residents of Boulder County are no doubt shaped or attracted by this recognition of the natural world. In my exploration of these programs, I was curious to understand to what extent childhood experiences were shaped by this type of place, particularly perceptions of and experiences with nature, by simply living and participating in the broader community that is Boulder County.

The past few decades of SLE in nature research has largely focused on what led current environmental activists, conservationists and educators to their career path, current beliefs and behaviors. Hsu (2009) limited participants to residents of eastern Taiwan, but only briefly touched on the influence of place on participants. Past research, while it has looked at international cross-cultural experiences, has not explicitly explored this concept of place and how it may have influenced participants’ perception of experience. While I did not
make it the primary focus of this study, I paid particular attention to the mention of place by participants and their perception of its influence on their attitudes, beliefs and behaviors.

**Study Participants**

For the purposes of this particular study, I did not select participants based on current occupation, as many SLE studies in the past have done (Chawla, 1998, 1999, 2007; Furihata et al., 2007; Palmer, 1993; Sward, 1999; Tanner, 1980). Farmer et al. (2011, p341) notes that “few, if any, studies have sought to comprehend the intricacies of SLEs among individuals engaged in pro-environmental behavior that were not selected based on the individuals’ being strict ‘environmental activists.’” Critics of SLE research argue that environmental professionals would be more likely to credit their careers to childhood experiences in nature in order to be consistent with their personal and socially perceived identities when compared to people outside of such occupations. The participants of this study will help address this concern by exploring the SLEs of individuals outside of environmentally-related occupations.

The study participants consisted of Thorne, Wild Bear and CUSD program alumni, identified through newsletter invitations, existing database records, and institutional memory of past participants in each program. All study participants were older than 18 years of age. I also looked to understand any potential multi-generational perspective by noting year and time since program participation (e.g., 5 years; 10 years; 25 years). However, due to the limited response rate and alumni contact information I received, I was unable to select participants based on a variety of experiences and the gender ratio was a near 2:1 female to male (15 females; 6 males).
Table 1: Study Participants’ Demographics (n=21)

<table>
<thead>
<tr>
<th>Program</th>
<th>Male</th>
<th>Female</th>
<th>Age Range</th>
<th>Ethnicity</th>
<th>Year of Participation Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thorne</td>
<td>1</td>
<td>5</td>
<td>19 – 50 years</td>
<td>Caucasian</td>
<td>Early ’70s – 2006</td>
</tr>
<tr>
<td>Wild Bear</td>
<td>2</td>
<td>5</td>
<td>20 – 26 years</td>
<td>Caucasian</td>
<td>1995 – 2003</td>
</tr>
<tr>
<td>CUSD</td>
<td>3</td>
<td>5</td>
<td>20 – 33 years</td>
<td>Caucasian</td>
<td>1990 – 2007</td>
</tr>
</tbody>
</table>

All of the participants identified as Caucasian, with the exception of one CUSD participant who identified as “other” on the survey, but left no contact information. As such, this study is limited in its ability to speak to the varied experience of people from different ethnic and racial backgrounds, but given the demographics of Boulder County (91.2% white persons), these results do not come as a huge surprise (U.S. Census Bureau, 2013).

Due to programmatic logistics and limited historical database information, I had a difficult time tracking down former Thorne participants to share their story. While there was great potential to tap into generations of Thorne participants, this study was unable to achieve that to any large extent. After approximately 10 months of outreach efforts and meetings with Thorne staff, and in the interest of obtaining an adequate amount of nature program narratives, I was presented with the opportunity to include the Wild Bear program. Because their programs are similar enough in their overall mission and approach to nature education, I used these two programs to represent PBEE and nature education programs. My hope is that collecting stories from these two individual programs will enable me to better understand the dynamics of such programs and how they compare to a program like CUSD. Wild Bear is located in Boulder County as well and thus remains within the geographical boundary I established for this study.
While CUSD does offer environmental and outdoor education, through such programs as their wilderness camps and field classes, the programs within CUSD that are not explicitly linked to environmental education serve as a comparison group, with Boulder County, Colorado serving as a geographic control. This geographic component has proved useful when considering the influence place has on identity formation and environmental stewardship through social practice theory’s concept of cultural worlds and its specific focus on local practice.

**Study Approach**

In my study proposal and as mentioned above, I planned to conduct the study through a mixed-methods approach through interview and survey methodologies. As cited above, there is evidence in the literature that this approach can be quite effective in gaining a holistic understanding of the question at hand as the strength in each approach can complement the other. Below I will explain each approach I aimed to employ and I will provide an explanation for how each approach evolved over the course of the study.

In an effort to maintain privacy, the names used in the written analysis of this study are pseudonyms selected either by the participant or myself. The interviews were conducted either in person, often at a local coffee shop, or over the phone, depending on the participants’ location and availability. The duration of most of the interviews lasted between 20 minutes to an hour and were recorded using a digital voice recorder and later transcribed, resulting in over 200 pages of transcript and over 11 hours of recording. Additionally, I took notes during the narrative and following conversation, noting interesting or key comments mentioned by the participants. I used the narrative prompt, follow-up questions, the “Who
am I?” question, and survey responses when available as a general guide during the interview, while also making every attempt to capture participants’ experience through a conversation that was natural in flow and content (See Appendices). I used participants’ words and direction as a way to explore experience and only occasionally needed to steer the conversation back to relevant program or life experience. Table 2 below depicts each method of data collection in the order and timeframe completed.

**Table 2: Data Collection Timeline**

<table>
<thead>
<tr>
<th>Method</th>
<th>Date Range</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot Interviews</td>
<td>November – December 2011</td>
<td>Thorne (n=3); CUSD (n=2)</td>
</tr>
<tr>
<td>Online Survey</td>
<td>May 2012 – September 2012</td>
<td>CUSD (n=21)</td>
</tr>
<tr>
<td>Follow-up Interviews</td>
<td>July 2012 – January 2013</td>
<td>Thorne (n=3); CUSD (n=6); Wild Bear (n=7)</td>
</tr>
</tbody>
</table>

**Pilot Interviews**

I began the study by conducting five pilot interviews with participants from Thorne (n=3) and CUSD (n=2). The pilot interview process provided a means through which I was able to navigate along the “strange paths” of the research process (Seidman 1998, p32). The pilot interviews were intended to help me understand which questions were most appropriate for the context of this study, how the interview and questions most comfortably flow and to reinforce that I was asking an appropriate research question. Their responses and suggestions served as the basis for constructing the survey intended for a broader population.
During the pilot interview process, I invited participants to reflect on their experiences, providing the following general prompt regarding their specific program and the experience they had:

I am interested in hearing about your personal experience with the Thorne/CU Science Discovery/Wild Bear program. Take a moment to recollect your experience and when you are ready to begin, please state what year and specific program you participated in. Feel free to take as much time as you need to share your reflections on your experience. I will not be asking you questions until you feel as though your story is complete, but I will be taking notes as you share.

Three of the five pilot participants mentioned that they phoned their parents to help “jog” their memory or looked back at old photos taken during the program. I do not view this preparation as falsely attributing influence to the program when there was none; I view it as an extension of the narrative process and reflection. Images and shared story-telling are frequently used in our everyday lives to remind us of people, places and events. We might often revisit these images or stories not because we’ve forgotten, but to reinforce the memories we have.

Participants often mentioned at the conclusion of our conversation just how much they enjoyed this process of reflection and several mentioned that they had not quite realized the impact of the program on their lives prior to this reflection. While this may be seen as a limitation of the study and a residual of the research process in general, at no point in the process did I suggest the program influenced their lives unless they themselves mentioned the influence. As such, I view this as a natural part of the narrative process and the ability of people to reflect on past experiences and articulate the extent to which those experiences have shaped them over time.
During both the pilot and follow-up interview (further explained below), I invited participants to take as much time as needed to describe their experience, while I took notes of their responses and especially those responses related to my research questions. Following the telling of their story, I began with follow-up questions to encourage further reflection on the experience and their current understanding of its influence on their life (see Appendix B).

**Survey Methodology & Instrument**

By coupling survey questionnaires with narrative interviews, I aimed to understand the larger context of those experiences from a larger population than could be managed and acquired through narrative interviews alone (Babbie, 1973; Elliot, 2005; Johnson & Onwuegbuzie, 2004). I constructed a survey using the initial pilot interviews with participants from both Thorne and CUSD (Wild Bear was not yet a part of the study population). I elected to construct a close-ended survey that included a comment and reflection section wherein the participants could provide their own answers based on their experience (Babbie, 1973).

Based on the results from the pilot interviews, I compiled a list of survey questions consisting of basic demographic questions, select pilot interview questions, select survey questions from a study completed by The Nature Conservancy’s LEAF Program (2011), and Clayton’s (2003) abbreviated environmental identity scale (Appendix C). I received permission from the author(s) of each study to include their questions within the context of my survey.
The use of pilot interviews as a means to construct survey questions was my effort to understand which questions were not only most suitable for the survey, but which questions would likely aid in a richer understanding of experience (Elliot, 2005; Furihata et al., 2007; Johnson & Onwuegbuzie, 2004; Seidman, 1998; Miles & Huberman, 1994). My original intention in using the survey data results was to conduct a simple analysis using descriptive statistics and group comparison to enhance and extend the interview findings. Given the existing records of each program, I had established a sample size of 200 from each program to be targeted for the survey portion of the study. As my familiarity with the number of eligible program participants increased, this number appeared as though it would be representative of the population (Babbie, 1973; Salkind, 2004).

Based on my initial conversations and meetings with both Thorne and CUSD program staff, I believed I would be able to access a large population of former program participants for the survey portion of this study. While Thorne staff fully disclosed that they had a limited former participant database, I was assured that collectively, we would be able to gather a number of respondents. Through the CU Foundation’s database records of the CUSD program, CUSD staff also believed I would be able to contact a number of former participants based simply on the volume of contact records. Contacts for both programs, however, proved to be either limited or outdated. I make note of this circumstance here not to place blame on either organization, but to highlight that I believed I would be able to receive an adequate survey response from past participants of both programs. It was based on this knowledge that I moved forward with the survey.
Using a free online survey tool available from “Google Docs,” I launched two program specific surveys for Thorne and CUSD. While all of the questions regarding general program experience were consistent between the two surveys, the surveys differed in the list of classes in which survey participants had participated and which were particular to each program. I reviewed each of these surveys with Thorne and CUSD program staff prior to the online release in May 2012. The survey link was sent to all email contacts I had from Thorne database records, which at the time of release consisted of 16 email contacts. Working with the CU Foundation office and their CUSD database files, I filtered through over 11,000 data entries based on birthdate alone to ensure that all former students I contacted were over the age of 18. I also controlled for repeat entries. I found 535 records that matched these criteria – records that included parent names, home address, phone number (occasionally), student name and birthdate. I ran an additional filter search on the email contact database and of the 535 qualified records, only 40 of those provided an email contact match. I sent the online survey to all 40 available email contacts and elected to mail-out postcard invitations to the 535 addresses I was able to obtain. Three weeks following the initial mail-out, I mailed an additional 300 reminder postcards. Due to the prohibitive cost of printing and mailing the postcards, only these mail-outs were conducted for the CUSD survey. No invitations were mailed to Thorne participants.

Out of approximately 535 eligible CUSD participants, I received 21 responses to the online survey (response rate of 4%). My success with former Thorne participants proved to be as formidable, as I was only able to obtain contact information for 16 former participants. Of these, I received six survey responses. Due to this low response rate, I did not offer the survey to Wild Bear participants and chose to only conduct interviews with them. The
survey was also intended as an additional means to generate follow-up interview participants. The follow-up interview was designed to serve as an extension of the survey responses, allowing the participants to share their program story in greater detail, beyond what could be captured through the survey alone. All survey participants were invited to provide contact information to participate in the follow-up interview process. While I received the most survey responses from CUSD participants (n=21), only five respondents elected to provide follow-up contact information. However, they did include comments and reflections, which I have included within the findings chapter.

I did not have adequate address information for Thorne participants and while I sent informational postcards about the study to Wild Bear participants, I did not include a survey. The CUSD and Wild Bear addresses consisted of parent contact information from the time of participation and only included the name and birthdate of former students. As such, the contact information was dated and may not have been current due to family and participant relocation. However, I received less than a dozen “undeliverable” postcards out of the 535 cards sent to CUSD addresses. The postcards included a request to visit an online survey link that led past program participants to the online survey tool. As detailed above, the survey was designed to solicit information about program influence on pro-environmental attitude, beliefs, behavior and current profession. While this study intended to explore and understand a variety of experiences within each program, the survey sample size does not reflect the array of participants and varied perspectives for which I had originally hoped.
Follow-up Interviews

Originally, I had planned to use the survey responses to gather contact information and willingness to participate in follow-up interviews. While all of the participants I interviewed as follow-up to the survey did provide this information, the limited response rate and number of survey respondents who provided contact information prevented me from being selective in my follow-up interview process. That is, it was my intention to understand through the survey a variety of experiences in terms of gender, age, ethnicity if varied, and type of program memories. I had hoped that follow-up interview participants could be selected based on their survey responses in terms of age, gender, ethnicity if varied, and type of program memories. Due to the limited response rate, I chose to follow-up with all respondents who left contact information regardless of their responses. The interview prompt and survey instrument is included within the appendices to provide context for the interviews and survey questionnaires.

Following the distribution and receipt of the survey questionnaires, I was able to conduct follow-up interviews with participants who had provided follow-up contact information. I was able to conduct survey follow-up interviews with five CUSD participants. For those participants who participated in the survey portion of the study, I then reviewed their survey responses to touch on any topics that were either not mentioned in their narrative or to better understand a particular response.

The remaining interviews I was able to conduct were with participants who had not participated in the survey (n=11). Their contact information was generated either through a current participant connection (e.g., follow-up participants recommended their name and
contact information) or from program staff who provided contact information for former participants. In these particular interviews, I maintained the same prompt from the pilot interviews and looked for opportunities during the conversation to ask questions related to the survey instrument related to hands-on learning, sense of wonder, supportive parents, and academic and/or career choice. Similarly, while I did not provide Wild Bear participants with a survey option, I did address many of its questions within their interview after they shared their stories. The follow-up interviews conducted as described therefore proved to be an important and substantive step in confirming and extending the initial pilot interviews and survey feedback, which may help strengthen the findings and implications of this study (Salkind, 2004). Table 1 presented at the beginning of this section provides a breakdown of interview participants from each program.

My approach to the follow-up interview process resulted in a combination of interview approaches, beginning with a more narrative style process leading into a more semi-structured process. Due to the nature of the follow-up interview and its combined exploration of experience and survey response, this process served as an appropriate approach for me to understand experience and its relevance to my research questions. Semi-structured interviews are typically guided though open-ended questions, directed by the researcher. When survey responses were available for the interview process, I followed the narrative with both follow-up questions to the narrative and to the survey. This approach is considered more suitable for understanding specific experiences, but I remain sensitive to the fact that the semi-structured nature of this type of interview can limit the opportunity for impromptu explanations (Scheibelhofer, 2008).
Being sensitive to researcher reflexivity and what I bring to the interview space, I did my best to ask the questions in a way that fit most naturally with the flow of conversation. I asked follow-up questions to probe more deeply into the experience reflected in the survey response and to better understand what participants mentioned in their narrative. At every chance possible, I conducted the interviews in person, which often resulted in longer, more personable conversations (n=9). However, due to the current geographic location of many of the participants, phone interviews were necessary (n=12). Additionally, I encouraged each participant to follow-up with me if they recalled anything after we visited, but none of the participants actually did.

Ultimately, I was able to conduct six Thorne interviews, eight CUSD interviews, and seven Wild Bear interviews for a total of 21 interviews, pilot and follow-up combined. While I began to hear repetition in program experience prior to completing the 21 interviews, in order to draw insight from these experiences and make adequate conclusions, I continued collecting participants’ experience until I had exhausted the available program contacts.

Prior to the follow-up interview process and in my review of Holland’s research on identity, I felt that if I were exploring identity, then I needed to allow the participants the opportunity to articulate their identity as they understood it. Following Kitchell, Kempton, Holland and Tesch’s (2000) study on environmental activists, I used Kuhn and MacPartland’s (1954) approach to self in the question “Who am I?” allowing participants to select up to 20 words or phrases they might use to describe themselves. Kuhn and MacPartland (1954) argue that if you are conducting research on identity, or as they frame it “self-attitudes,” then understanding and asking individuals directly what their self-attitudes are is the only logical
way to conduct such research. They also address the significance of socio-cultural influences on identity or self-attitudes, which is in line with much of Holland’s work on social practice theory. In applying this question, I presented the question more as a prompt, asking them if they were to describe themselves to themselves, what words or phrases would they use. While a short and direct question, many of the participants first responded by stating it was a “tough” question. Their initial response reinforced that our identity is not always something immediately accessible and at the forefront of our mind.

**Program History Interviews**

In addition to interviewing the participants of each program, I conducted interviews with program directors to better understand the history of each program, the details of which will be explored in the following chapter. During the pilot interview and survey development process, I began to realize that having a solid understanding of how each program began along with its evolution over the years would be integral to gaining a deeper and richer understanding of how participants experienced each program. I conducted program interviews with Thorne and CUSD staff in March 2012, prior to the release of the online survey. The Wild Bear program was included in the study in August 2012, at which point I interviewed the program founder. Because I have worked closely with each program throughout this study, the directors were cooperative and eager to carve out time in their busy schedules to share their program history.

I opened each program history interview with a general, informal prompt that asked each program to describe how their program began and the motivation behind the vision. Thorne’s program founder, Oakleigh Thorne, and Wild Bear’s program founder and
Executive Director, Jill Dreves, remain closely involved with their program and were therefore able to participate in these conversations. For CUSD, the program founder is no longer directly involved with the program, but the existing program director maintains an understanding of the program history and its evolution over the years. Each of these interviews were digitally recorded and later transcribed, lasting between 45 minutes to one hour in length.

A brief program history is available on each program’s website and when revisiting the interview recordings, I was able to cross-check specific dates and general program evolution. For Wild Bear, I also received copies of relevant newspaper clippings regarding Wild Bear’s programs and key historical events, which I was able to reference as needed. Once I established my understanding of the program history, I created summary tables for each program and asked the programs to confirm the accuracy of their respective table (see Chapter IV). By understanding the history of each program through interviews, online and archived data, I felt I was able to enter each subsequent participant interview with a deeper understanding of their experience and the mission on which their experience was founded.

**Participant Observation**

Over the past two years, I was able to conduct participant observations with each of the programs. While these observations were more casual than a true ethnographic field observation should be, considering I did not take detailed notes during my observations and all participants were fully aware of my presence, these observations did allow me to understand each program in a real-time context. I was able to participate in activities alongside the students, ask questions of the students and instructors, and get a sense for how
a former Thorne, Wild Bear or CUSD student’s experience might have been. In my interview analysis, I often reflected on these experiences within the context of what participants recalled through written reflection and memo-ing. While I did not use this reflection directly in my analysis, I felt as though these observations helped me have a richer understanding of each program’s learning environment and in turn, provided me with additional perspective.

**Data Analysis**

Originally, it was my hope to conduct a mixed-methods approach with the aim of triangulating the findings to enrich understanding. However, given the limited response rate I received from the survey portion of the study, a mixed-methods approach no longer made sense in the context of the data I was able to collect. While I find value in the survey responses I did receive and believe they make interesting suggestions, I will not be engaging in a true mixed-methods analysis. I will present a descriptive table of the survey results and when available and appropriate, make connections between survey responses and interview narratives. Much of this study’s analysis will focus on in-depth narrative analysis of the interviews I conducted with each participant.

To conduct the narrative analysis, I used my research and guiding questions to help identify emergent patterns and themes of experience among participants: When participants recall program experiences, what experiences remain salient to them and how do they understand those experiences to have shaped them over time, including but not limited to their environmental identity? Do participants believe these experiences influenced their environmental identity and stewardship behaviors? If so, how? Is there a difference
between nature-based and science-inquiry programs regarding formation of an environmental stewardship identity? If career choice can be a reflection of identity in action, how were participants’ career choices shaped by the influence of these programs, if at all? Does place play a role in the saliency of these experiences and their influence on identity formation over time?

However, narrative analysis does not look to necessarily use predetermined codes as a part of analysis and aligns itself most naturally with emergent coding, analyzing the data as it exists as opposed to forcing it into a predetermined coding scheme that may or may not adequately reflect experience (Miles & Huberman, 1994). Seidman (1998, p30) stresses “the importance of paying attention to the words of the participant, using those words to report on the results as much as possible, and looking for both salient material within individual interviews and connections among interviews and participants.” I did not approach the transcripts with a set of predetermined codes; rather, I approached the transcripts with “an open attitude, seeking what emerge[d] as important and of interest from the text” (Seidman 1998, p100).

I aimed to use member-checking with interview participants to insure a collective understanding of experience between myself as the researcher and the participant as the experiencing individual. This process was also intended to give participants the opportunity to reflect on or follow-up with me about additional thoughts and reflections on their experience. While I sent transcripts to all interview participants, only three replied to reinforce their experience. I assume that for those participants who did not respond, their story remains consistent with what they shared during their interview. In the written analysis
of the narrative interview and survey data, confidentiality of study participants was maintained through the use of a participant-selected, or at their request, researcher selected, pseudonym (Babbie, 1973; Miles & Huberman, 1994; Seidman, 1998).

While I was the only researcher, interviewer and analyst for this study, I did elect to check my understanding of the interview transcripts through “inter-rater” reliability check with select transcripts (Miles & Huberman, 1994; Seidman, 1998). I asked two of my University of Colorado colleagues, both of whom possess a Doctorate in Education, to review an interview transcript. In reading the transcript themselves, I did not provide them with the themes I had identified, but asked them to make note of what stood out and emerged to them. This approach is consistent with what Seidman (1998) recommends with regard to narrative analysis. One colleague was not familiar with much of the place-based education, significant life experience or environmental education literature and served as an unbiased perspective, at least with regard to contextual presumptions. The other colleague is well-versed in those subject areas and could bring interesting observations in relation to the literature to my attention.

Together we reviewed our collective findings to look for marked differences in understanding. This approach to check my initial findings proved to be a constructive process. My colleagues’ analysis of the text was often more general and broadly scoped than my own, which helped to remind me of the big picture themes occurring in the narratives. Their themes and notes were consistent with the more specific themes I had assigned, but tended to be less detailed. I also asked my colleagues about specific memos I had made in the narrative regarding questions I had or possible explanations for why the experience
resonated as it did. We talked through each of the memos I had made beyond the general themes. In doing so, I was able to check whether or not I was reading too deeply into a particular piece of the narrative and ascribing an unfounded explanation. In our discussion of these interpretations, I was able to check my own interpretive inclinations within the narrative, paying greater attention to the words of the participant.

The stories within the narrative that stood out to me also stood out to my colleagues as being significant experiences for the participant. I used this process to help me revisit the remaining interview transcripts as needed and to check my overall analysis. When I felt as though I was placing too much emphasis on a word or explanation, I was careful to take a step back and re-focus on what the participant was trying to communicate about their experience. In the end, I must ultimately trust my experience, understanding and judgment of the interviews, the interactions shared, and the stories told. While I certainly heed the insight of my colleagues, it becomes my obligation as the researcher “to be faithful to the words of the participant” and “to maintain the dignity of the participant in presenting his or her oral speech in writing” (Seidman, 1998, p104).

Over the course of my interview analysis, I began to recognize consistent emergent themes across the interviews. I kept track of these themes for each interview, which will be broken down further in the findings chapter below. I created a table of these common themes and kept tallies of each as I read through the interview transcripts. I revisited these themes in earlier transcripts to make sure they remained consistent with my initial impressions and made changes as needed. I made note on each individual interview of the dominant themes that were particular to that individual. My transcript notes at the top of each interview
highlighting the major themes within each narrative also helped in this process of revisiting and rechecking my impressions and initial review.

Due to the relatively small size of my interview transcripts, I did not use any formal qualitative analysis software. Instead, I used printed copies of the transcripts to interact with, underlining, highlighting, bracketing, memoing, and diagramming to help explore each participant interview and their respective program experience. Seidman (1998, p108) supports this interaction between the researcher and printed text arguing “there is a significant difference between what one sees in a text presented on paper and the same text shown on screen, and that one’s response is different too.” Additionally, I paid attention to which types of science-inquiry or child-nature experiences were present in each program and which of these elements most resonated with participants.

While use of emergent codes or themes is strongly encouraged within narrative analysis, there is no particular standardized approach to analyzing transcripts or sharing interview data. However, Seidman (1998) recommends the process outlined above as a first step and from this process, suggests developing participant profiles which aim to capture the main experience of that individual. After the reading and analysis of each transcript, I created profiled summaries for what emerged as most salient in their narrative. I made note of specific stories shared by participants that would help clarify this saliency. I view this process as a step towards increasing validity to help ensure that what I am understanding of their experience is appropriate and well-grounded in their story. For as Seidman (1998, p102) says, “by crafting a profile in the participant’s own words, the interviewer allows those words to reflect the person’s consciousness.” Elliot (2005, p23) additionally supports this
notion suggesting that internal validity is improved when participants can “use their own vocabulary and conceptual framework to describe life experiences.” Due to space considerations, I will not be presenting each individual profile within this document. However, I found this to be a useful process for revisiting each program participant and it was particularly helpful in categorizing the emergent themes with regard to my theoretical framework.

In order to present the emergent themes in a context that is accessible and clear to the reader, I created a table listing each of the themes and the distribution across each program. From this list of emergent themes, I revisited my framing theory on identity formation and social practice within the context of significant life experience research. I wanted to explore the extent to which these theories helped illuminate, shed light on and fit with my research questions and study context. From this theoretical framework, I was able to establish general categories by which to group the emergent themes and I will present the participants’ experience and shared stories as they relate to each of these broad, theory-based categories.

With respect to the final analysis and presentation of the interview data, I present the analysis and findings in a way that seems to most naturally and adequately represent the stories and experiences shared. It is my hope that I have been “faithful to the words of the participants” and have done justice to their lived experience (Seidman, 1998, p104).
CHAPTER IV
PARTICIPATING PROGRAMS

Program History & Background

In order to gain a better understanding of the programs with which I was working and the core mission of each, I sat down with the programs’ founders, current directors and staff to hear their understanding of their organization, the driving force behind its founding, and the vision they have for its future. In this section, I will provide a summary of these conversations, including the program history, which helps provide context for the analysis of participants’ experience.

As elaborated in the methods section above, I began each interview by asking each program director and/or staff to explain how the program began and how it has evolved over the years. I asked follow-up questions to help clarify my understanding of this narrated history and I concluded each interview by asking about their future vision and hope for their program. Through this process, I found that capturing the oral history of these organizations illuminated each of their stories in a way that is difficult to capture via written historical text alone. In other words, these oral histories colored and enlivened my understanding of each program.

Thorne Nature Experience

Thorne Nature Experience began as Thorne Ecological Institute in 1954. Born out of the desire of founder Dr. Oakleigh Thorne, II (referred to as “Oak” by all who know him) to connect people to their natural world and to share his love of birds and nature with others, Thorne Ecological Institute was established as a means to do just that. On March 26, 2012,
I visited with Oak, along with two of his primary staff, Education Programs Director, Erin O’Neil Saunders and Education Programs Coordinator, Katie Hill Renga, to hear and record the evolution of this program firsthand. The history and background of this program is based on this conversation and is consistent with the historical content available on Thorne's website (www.thornenature.org).

Oak’s inspiration for founding Thorne stemmed from an experience in graduate school at Yale several years prior, which included his integral role in saving the Sunken Forest of Fire Island, New Hampshire. As a part of this project, he worked with the newly founded Nature Conservancy and its founder, Dick Poe, to establish the funds to save the forest from development until it was integrated into the care of the National Parks Service through the National Seashore Act. In a bit of a fortuitous twist, Oak details how the procurement of funds to save the Sunken Forest could not be released to him, but could only be given to a non-profit:

[...] they would not give me the money. They said it has to go to a tax-exempt non-profit organization. So I called Dick Poe and I said, “We’ve got $15,000! But they won’t give it to me, it has to go to a non-profit organization. What’s that?” I didn’t know anything about those things.

From that experience, however, came the knowledge and understanding of the value of such organizations with regard to the conservation and preservation of natural resources. When Oak moved to Colorado two years later to pursue his doctorate, he immediately founded Thorne Ecological Institute with the hope that it would secure a non-profit status over the next two years and become an organization promoting ecological education. However, he is very quick to point out that the success of Thorne over the years was not due to his vision alone, but thanks to the creative vision of “many wonderful people.”
From its founding, Thorne Ecological Institute played an integral role in the state of Colorado, its staff helping to establish the Colorado office of The Nature Conservancy, the Aspen Center for Environmental Studies, the Keystone Science Center, and the Colorado Open Space Coordinating Council, which worked to bring business and industry people and environmentalists to the same table in an effort to work towards sustainable practices. According to Oak, out of these collective efforts emerged the process of environmental impact statements, which was later adopted by the National Environmental Protection Act (NEPA). From its founding in 1957, Thorne Ecological Institute served as an environmental consulting firm while also frequently leading place-based environmental education field trips with Thorne’s Junior Natural Science School summer camps.

It was not until the mid-nineties that Thorne Ecological Institute moved away from environmental consulting services becoming exclusively focused on children’s environmental education. In collaboration with the City of Boulder’s Open Space and Mountain Parks (OSMP) and Boulder Valley School District (BVSD), Thorne Ecological Institute Board Members looked to purchase and help mitigate their current Sombrero Marsh location, which had served as a city dump for many years. Since 2001, in continued partnership with Boulder’s OSMP and BVSD, Thorne Ecological Institute staff have provided place-based environmental education to local school children and youth at the restored Sombrero Marsh and the adjacent Sombrero Marsh Environmental Education Center. Table 3 below provides a summary of Thorne Nature Experience’s program history.
When asked how many children the Thorne program has touched over the years, Oak said it is approaching, if not well over, 200,000, local children and youth participants. In 2011, Thorne Ecological Institute announced that it would be changing its name to “Thorne Nature Experience.” Oak explained that for years Thorne board members had recognized the need to make a name change that more accurately embodied the current mission and role of Thorne and the Natural Science School programs. Erin and Katie explained that it was not uncommon for Thorne staff to receive requests to help with land mitigation, bats in attics and environmental surveys. As such, the new name more successfully embraces what Thorne does best: “connecting kids to nature.” On this note of connecting local children to nature, I asked Oak about the influence of his own childhood experience in nature. Without

<table>
<thead>
<tr>
<th><strong>Table 3: Thorne Nature Experience Program History</strong></th>
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<tbody>
<tr>
<td><strong>Date established:</strong> 1957, provided ecological consulting services and nature education; 1995, became exclusive to children's nature education</td>
</tr>
<tr>
<td><strong>Program Mission:</strong> “Thorne’s mission is to build Earth stewardship by connecting youth to nature through joyful, hands-on, place-based environmental education experiences.”</td>
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<tr>
<td><strong>Programs Offered:</strong> Thorne Summer Camp Program (est. 1957)</td>
</tr>
<tr>
<td>- Half-days + full-days, plus overnight trips</td>
</tr>
<tr>
<td>- Includes field trips to local natural areas</td>
</tr>
<tr>
<td>- Offers variety of programs for ages 3-15</td>
</tr>
<tr>
<td>Field Trip Program, Sombrero Marsh (est. 2001)</td>
</tr>
<tr>
<td>- Full-day field trips for BVSD 4th grade classrooms</td>
</tr>
<tr>
<td><strong>In-school Program (est. 1998)</strong></td>
</tr>
<tr>
<td>- Offers in-school environmental education program, targeting underrepresented students</td>
</tr>
<tr>
<td><strong>After-school Program (est. 2009)</strong></td>
</tr>
<tr>
<td>- Offers after-school programs for in-school program participating schools</td>
</tr>
<tr>
<td>- Emphasizes place-based nature education</td>
</tr>
<tr>
<td><strong>Annual Timeframe:</strong> Year-round (includes all programs offered)</td>
</tr>
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</table>
hesitation, Oak immediately credited that influence to his middle school biology teacher who, for Oak, made science come alive: “I was already connected to nature, but he made it all much more exciting and academic – and banding birds, I learned from him. That was great.”

The dedication to this mission of connecting children to the natural world is apparent in Oak’s ongoing involvement with the organization and through Thorne Nature Experience’s ongoing history of dedicated staff. I asked Oak, Katie, and Erin whether or not their vision for Thorne Nature Experience would continue to be set on child education and all nodded emphatically. Oak elaborated:

Yeah, and there needs to be ten of us. You know, there are not enough organizations doing the environmental education with youth and children. You know, we have lots of good organizations: Science Discovery, and Wild Bear, and Colorado Youth…that’s still not enough, still not enough kids being reached.

As Thorne Nature Experience’s program has evolved over the years to focus exclusively on place-based environmental education, program staff have worked to maximize their service to local Boulder County children and youth, expanding beyond the summer program to include both in-school and after-school programs. While the overarching mission of each of these separate programs is to connect children to nature, each differs slightly in its approach.

The summer camp program is an outdoors and field-based program that uses Boulder County Open Space as its classroom, reaching ages three to 15. The in-school program takes environmentally-oriented lessons into the classroom and focuses primarily on underserved populations, targeting schools that have a high percentage of students participating in free and reduced lunch programs and/or a high percentage of minority
students. In an effort to help address the achievement gap, the in-school programs are standards-based with the hope that what Thorne Nature Experience brings into the classroom will elaborate on and reinforce what is being taught in school. The after-school program is the youngest of the three programs now offered, adapting much of the in-school lessons as needed.

What is unique about the after-school program is that it continues to work with schools that are participating in the in-school program, establishing and building a relationship not only with the school, but with the children as well. The after-school program is one that the child can choose to participate in as a part of their after-school care. Erin explained that the goal of these expanded programs is to be able to offer local children and youth the opportunity to participate in place-based nature education year-round, for Thorne Nature Experience to create as “many contact points as we can.” Thorne Nature Experience, the founder, director and staff’s 56-year commitment to doing just this is made apparent through their programs, dedicated staff, and the financial and programming support they receive from the Front Range community.

All of the past Thorne program participants included in this study participated in the summer camp program, as the other programs had not yet been established. In the future, it will be interesting to explore what influence these additional programs will have on current and future Thorne Nature Experience participants.
Wild Bear Mountain Ecology Center

Established in 1995, Wild Bear Mountain Ecology Center was born out of a public elementary school teacher’s desire to connect children to their backyard through a hands-on learning environment that created an opportunity to make science and the natural world accessible and relevant to children’s lives. On both August 25, 2012 and December 13, 2012, I visited with Wild Bear founder and director, Jill Dreves, asking her about the history of Wild Bear and the inspiration that led her to its establishment. This oral history was supplemented with Wild Bear’s online history and archival data acquired from local news publications.

Jill’s vision looked to foster an appreciation and fascination for the local, natural community – much like the childhood experiences she had known. In her quest to connect children to their natural world, Jill drew in large part on her experience as a summer naturalist and trail guide with Vail Nature Center, where she began to realize the learning opportunities that were emerging during these nature treks:

I had been teaching public school for three years before I was doing the bug camps in Vail Nature Center, you know, and that was when I had that big epiphany that that was learning and – it also connected me to my childhood experiences.

The learning and growth that Jill observed on these Vail naturalist hikes reminded Jill of her own childhood experiences, ones she still cherishes and which had invited her to explore her love for bugs. Jill recalls how, as a young child, she was inspired by a female entomologist neighbor who lived in the woods behind her childhood home in northern Colorado:

I was enthralled by her trailer filled with insect collections, microscopes, field guides. She was the inspiration for my sister and I to pull bark off of dead trees, kick over cow/horse dung, collect butterflies and understand virtually every insect that lived at 7,700 feet in the mountains north of Fort Collins. This was the kind of learning that I wanted to share with the children in our community.
After her time as a public school teacher and summer naturalist in Vail, Jill moved to Nederland to continue on her journey as public school teacher, not losing sight of the inspiration she had found leading family nature hikes. In the formal classroom, Jill made every effort to connect her students to their local world: “I did all that I could to just make those experiences within the classroom as real to their own lives as I could.” In her desire to recreate what she had learned during her time as a naturalist, Jill decided she would start a summer camp for local children: “It wasn’t formalized what I was doing. It was more from the heart [...] that’s where I kept finding my heart going, was the nature center experience of all ages learning together.” Jill continued to reflect on her own childhood education and how those experiences had subtly and over time influenced her own perception of healthy and supportive learning environments:

And that’s what my school was – it was a family model. It was a school where I was five and I was in a classroom with 12 year olds when I was a kid. So for me, Wild Bear was really modeled after [my school], which was 32 kids, two classrooms, kindergarten through eighth grade [...] and we would be journaling and hiking and doing all the things that we do at Wild Bear [...] those teachers, they just had us out of the classroom, all of the time. And applying things, you know? I was so lucky and I didn’t realize it until later how lucky I was.

While still employed as a teacher during the school year, Jill started the summer program in her own home in Nederland, Colorado, relying on her teacher salary for income and an old van for field trips. The program began as three three-week sessions during the summer, each filling to capacity with eight children (ages 5-10) during the summer of 1995. Today, Wild Bear programs serve thousands of children annually. Table 4 below provides a summary of the programmatic history of Wild Bear.
Table 4: Wild Bear Mountain Ecology Center Program History

| Date established:          | 1995, summer camp only  
|                          | 1996, summer camp and after-school program |
| Program Mission:          | “Wild Bear’s mission is to provide year-round educational programs to people of all ages fostering a life-long appreciation of the environment and promoting an environmentally aware and ecologically sound community.” |
| Programs Offered:         | After-school program  
|                          | • Provides elementary school after-school programs everyday throughout the school-year  
|                          | • Includes frequent field trips to local natural areas and exploration of the natural world  
|                          | Summer camp program  
|                          | • Provides week-long summer camp programs for ages 3-12 for duration of summer (no overnight trips)  
|                          | • Includes field trips to local natural areas, often with an art and music component  
| Annual Timeframe:         | Year-round (includes all programs offered)  

The program began as “Wild Bear Science School” with a science-based approach to learning about the natural world that also integrated the arts through creative interpretation of the mountain ecosystems. Jill’s approach to learning environments was driven by multi-aged, child-centered learning and inquiry in the natural world, approaching learners with compassion, understanding and patience. Jill also understood the value of repeated experience and offered the program throughout the year in all weather conditions. Programs often include field trips such as treks on local Boulder County hiking trails in search of insects, creek explorations for various invertebrates, snow science, collection and identification of insects, construction of “real” herbariums, creating natural dyes from cochineal and other sources and, on the rare occasion, road kill dissections. Jill also became known locally as the “bug lady” – her true passion being insects – and she often brought the “traveling Arthropod Zoo” out to classrooms throughout the region. Additionally, Jill
acquired a collection of live, local animals for the children to care for and learn from. Each of the three original Wild Bear summer workshops was followed up with a “parent night,” a potluck where the children talked about their projects and handed out their own hand-written business cards that read something like: “Joe Smith, Entomologist.”

Eventually Wild Bear programs became housed in the Nederland Community Center for several years and then moved into the local elementary school basement for seven years (Spina, 2010). During this time, Jill made the decision to turn Wild Bear into a local non-profit and took a permanent leave of absence from public school teaching to focus exclusively on Wild Bear. Through the encouragement of a Wild Bear parent, Jill began the process:

They were going to pull the plug on us because the community center was going to get bulldozed […] and I had a parent come to me and, this was in ’97, said, ‘Well, why don’t you turn it into a non-profit organization?’ And honestly, at the time, I was like ‘What? What is that? I don’t even know what that would be. How would it be different?’

After securing a non-profit status and with the help of the Wild Bear parent, Jill applied for and received a Berger Foundation grant for $18,000 and she put in her resignation that next day. In the next three years, the Wild Bear program began to really take off as Jill navigated the new waters of the non-profit world.

The name too evolved into “Wild Bear Center for Nature Discovery,” eventually landing on its current name: Wild Bear Mountain Ecology Center. In 2010, Wild Bear Mountain Ecology Center gained a more permanent home in downtown Nederland, establishing a true nature center that allows Wild Bear to more fully deliver its message to all visitors, young and old alike (Spina, 2010). The new center can now accommodate the Wild Bear staff, a
gift shop, the year round programs, and engaging creatures like hissing cockroaches, turtles, crayfish, and a tarantula – an inviting and warm space that encourages exploration and fascination.

In addition to environmental and outdoor education for the young, Jill reaches out to the greater community as well to help build awareness and appreciation among all community members. Since its initiation in 1995, Wild Bear began hosting an annual fall event known as the “Enchanted Forest” that invites children, families and friends to explore the forest and its friends on foot. The Enchanted Forest entails volunteers dressed in mountain lion, owl, coyote, raccoon, and fairy costumes to share stories from the forest while tapping into a child’s sense of wonder and fascination. It has become a main fall event for many residents of Nederland (Spina, 2010).

Additionally, Wild Bear was integral in the preservation and clean up of Mud Lake, which had served for years as an informal dump for Nederland residents. The 260 acres were slated for development and in 1999, the town of Nederland and Boulder County Parks and Open Space asked Wild Bear, then just four years old, to partner in Mud Lake’s preservation. Wild Bear was on the town ballot in 1999 and the voters approved the preservation of Mud Lake as well as an environmental center to be built by Wild Bear on its own five acres at Mud Lake. This approval inspired Wild Bear children and their families to remove over 30 tons of trash from the 260 acres, instilling a long-term sense of pride for how people can care for and improve their natural environment. The preservation of Mud Lake and the cleanup eventually led to reclaiming over 3,000 acres of open space including Mud Lake and Caribou Ranch Open Spaces (Wild Bear, 2012b). A recent 2012 planning board approval
has granted permission to Wild Bear to design and build a state-of-the-art green nature center on this property:

A place for all ages and all walks of life, the Mountain Ecology Center will achieve a wide range of goals such as educating about how we can minimize our carbon footprint or how we can grow our own food at this high elevation [8,250 ft.] as well as encouraging an appreciation and love for this unique Rocky Mountain ecosystem (Wild Bear, 2012b).

In my conversations with Jill, it became clear that her dedication to connecting people of all ages to nature and the local world around them is, for her, a conviction and way of life. Wild Bear is no doubt her expression of that calling.

All of the Wild Bear study participants participated repeatedly in Wild Bear programs and six of the seven participated in both the after-school and summer programs. It is the repeated experience and regular presence of Jill that many of them reflected on in their narratives.

University of Colorado Science Discovery

The University of Colorado’s Science Discovery program was founded in 1983 to connect local children and youth to the most current and relevant hands-on science learning. The program served as a way to connect the University community to the greater community at large and was driven by the desire to provide access to science learning. On March 23, 2012, I visited with CUSD’s Director, Stacey Forsyth, and the former Class Programs Director, Barbara Monday, to gather their understanding of the program, its overarching mission, and their vision for its future. I also referenced the online history of the program and other archival material to supplement our conversation.
Housed under the School of Education, Carol McClaren served as the program’s director and visionary from 1983 until 2005, where she and other campus colleagues helped grow the program from just 10 classes to over 200, while also developing a teacher professional development program and integrating faculty and departmental CU science research. Science Discovery began with a handful of classes, launched from the University of Colorado’s Fiske Planetarium, most of which focused on astronomy, the first and still most popular class: “Rockets for Junior Astronauts.”

As community and parent support for the program began to grow, so too did the program. Due to the growth of the program, CUSD moved off campus to provide summer classes for children and youth, renting out local schools during the summer months. In 2004, the program moved back to campus and is now situated at the Science Learning Labs on University of Colorado’s East Campus. Over the past 30 years, current CUSD Director Stacey Forsyth estimated that program has reached nearly 360,000 Colorado children and youth through its program classes and state-wide workshops.

As the program began to evolve over the years, so too did the classes offered. In 1988, CUSD began to offer a more interdisciplinary science focus with the Science Explorers and Science from CU programs highlighting current faculty research and in 1989, began offering overnight wilderness camps. In addition to the ongoing summer camp program, CUSD also began to offer teacher professional development classes in addition to in-school and after-school program classes. As more community-based partnerships throughout the Front Range began to form, the program’s focus shifted from University faculty and program collaboration as CUSD directors and staff looked to sustain the program through grant
monies and collaborative community partnerships. In 2008, in an effort to provide a more financially stable and sustainable future, the CUSD program was moved from the University of Colorado’s School of Education to the School of Continuing Education. This program move was accompanied by an explicit commitment to working primarily with CU STEM faculty and graduate students to deliver hands-on and inquiry-based science learning. While the program had always included aspects of CU’s science research, the program directors and staff looked to make the most of this transition and help the program become a greater part of many CU STEM faculty’s call for broader impacts. This transition also provided a more reliable source of financial support, enabling CUSD staff to focus their energies on providing access to hands-on science learning.

Science Discovery has embedded within its mission to make science accessible to all children and youth, looking to provide repeated learning opportunities for underrepresented and underprivileged populations. Barbara elaborated on this point: “It’s really offering these kids an experience that they couldn’t get otherwise […] creating the next generation of students who come from different backgrounds, but they know what is possible.”

In discussing the value of inquiry science experience for children and why that matters, Stacey explained: “I think it helps to keep their curiosity alive, because they all have it when they’re young and it just gets, I think, more diminished by traditional classes,” for a variety of reasons. Often, interest in science can wane as a child progresses through the traditional education system, but Stacey and Barbara view the program as an opportunity to provide a space in which that initial interest and curiosity can be enriched. Stacey further explained:

We really help to provide an experience for kids that really helps to keep that joy alive […] and then show them the possibilities of what they could do with it; show
them possibilities of different areas of science – things that they may not have ever heard of, or were intimidated by, or thought sounded really daunting, but kind of show them what that looks like and how it’s relevant to their daily lives and what they could do with it. And show them people working in the fields, exposing them to young scientists and just very cool scientists who kind of counter what they think of, I think is really a fun part of what we do.

Science Discovery’s director and staff view inquiry-based science as a learning process that is driven by children’s curiosity. Stacey and Barbara collectively explained that CUSD encourages this process by “asking them: ‘what would they like to know about?’ and just encouraging that – their own facilitation and exploration – and helping them, to lead them through that process of asking questions and then trying to figure it out.”

Additionally, Barbara elaborated on the life-wide, life-deep, life-long learning aspect embedded within CUSD, explaining that it is a learning environment not only for the young students that come through the program, but also for the undergraduate teaching assistants, graduate instructors, and CUSD staff. Barbara continued to elaborate on the ripple effect of CUSD and the potential influence it has on future teachers and the opportunities they are given through CUSD: opportunities to not only build skills within the informal context, but to take those skills into the formal classroom setting, potentially influencing the learning experience of their future students.

**Science Discovery Wilderness Camp**

In addition to the classroom-based summer classes, CUSD offered an experiential, outdoor wilderness camp for approximately 12 years. As was revealed through CUSD participants’ narratives, the wilderness camp program offered through CUSD from 1989 through 2011 differed quite significantly from other CUSD summer program classes. Although
participants of this program refer to it as “Science Discovery,” due to the marked difference in experience between this program and other more classroom-based programs offered by CUSD, I feel it is important to distinguish the two program categories prior to presenting the findings of this study. In order to better understand the dynamics of this program, I met with the former CUSD Wilderness Camp Program Director, Deborah Kulscar (Deb), to learn more about this particular program’s history and learning environment.

Deb and her husband, David Darst, led the program for CUSD for 12 summers. In the late eighties, with extensive training and educational backgrounds in outdoor and experiential education, Deb and David were presented with the opportunity to offer their Experiential Learning Associates program through CUSD. The wilderness camp trips were designed as overnight trips, five to 10 days in length, and included courses for ages 11-17. The trips typically took place in remote wilderness areas in the western United States including Great Sand Dunes National Park, Dinosaur National Monument, and Mission: Wolf in southwestern Colorado to Yellowstone National Park in northwestern Wyoming. Deb and/or David regularly led the trips over the course of the program and qualified young adult teaching assistants provided supplemental support.

At the peak of the wilderness camp, the camp was running up to 13 trips per summer. These trips were designed to be outdoor, experiential learning expeditions wherein the campers slept in tents, carried backpacks, and were assigned daily chores as the trip required. In addition to these tasks, campers often participated in a service-learning component, helping provide for the maintenance needs of the various locations they visited. They were given the chance to interact with knowledgeable adults in these areas such as park rangers,
wolf sanctuary directors, river guides and ecological specialists. Deb explained how she believes this type of experiential learning environment best engages youth:

Both of us [Deb and David] have NOLS and adventure backgrounds, so we wove in among the community building and the science, the adventure stuff – which of course, to engage young people, you’ve got to bring them into their bodies while their learning, I believe.

Deb went on to explain the various trips the wilderness camp offered and shared her own eye-opening experience at Mission: Wolf, which became one of the wilderness camps most successful trips. While I will touch on this in the findings and discussion chapter, over half of the CUSD study participants participated in a variety of wilderness camp trips and all of them reflected on their experience at Mission: Wolf. Deb’s own recollection provides, at least in part, an explanation for the success of the Mission: Wolf trip:

You know, it was just a life changer for me. I mean I’m from Ohio originally and so I, like all the other folks who have come out to Colorado, was just blown away – mountains and wolves and amazing natural world. And I had all of that stuff back in Ohio, just different […] but nothing like this. And so once we realized what we had, we were like: “We have got to get kids connected to the natural world. We have got to get kids out on the land,” and again building in the community, the adventure, and the informal science.

The wilderness camp trips were driven entirely by Deb and David’s passion for connecting children and youth to the natural world and the social communities of their trip destinations. Their aim being to help these young people envision for themselves a future wherein they are aware, compassionate and active citizens within their natural and social communities. Deb explained this dedication further:

I love getting kids out with their age group, their peer groups, because it’s a launching place for kids in middle school to learn about who they are in the bigger world […] you know, at middle school age their primary reason for existing is social. So, you know, they’re giggling in the van and we’re in this amazing Lamar Valley [and their not really paying attention], but it’s okay though. I think that somehow there’s got to be some seeds planted when they get out of the van, and we do the hikes, and we see the wolves. That’s my hope.
A particularly unique aspect of the wilderness camp is the multiple day experience in the outdoors. I asked Deb about the influence of technology on youth today and whether or not she has seen a transition in youth’s ability to connect to the outdoors and the natural world. In her response, she touches on the opportunities available to youth today, particularly within the more affluent communities of Boulder County, the brevity of their attention span and their near addiction to electronics:

So yes, I have noticed a difference. Kids can’t hang out quite as much. When they do, they go “Oh! That was awesome! I didn’t have my phone for a week. I’m ready for my music, but man, I loved that. That was great. I would do that again, but let me get to my music now.” So, you know, they really appreciate it. They go “Oh yeah, that was really cool! I survived.” So that’s the good news.

Deb believes in the value of getting young people, particularly during their adolescents, out of doors and into the natural world. While she has seen some aspects of young people change over the years, what has remained constant in her view is their ultimate appreciation for the natural world following such trips. For reasons that remain unclear to me, the wilderness trips are no longer a part of the CUSD summer program. However, the dedication of Deb, David and their staff and the influence of the program on past participants remains a significant part of CUSD’s program history.

Aside from the differences of these programs, a key component of each of the CUSD programs is the dedicated staff and directors that help facilitate these learning experiences and opportunities for students. All of the CUSD study participants recalled participating in CUSD summer programs at least twice, with the majority of participants participating multiple years throughout their childhood and youth. All of the participants participated solely with the summer camp program, either the CUSD classroom-based program or the wilderness trip. Table 5 below provides a summary the programmatic history of CUSD.
<table>
<thead>
<tr>
<th>Date established:</th>
<th>1983, program based on-campus and within community</th>
</tr>
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<tbody>
<tr>
<td>Program Mission:</td>
<td>CUSD: Increase interest and literacy in STEM-related fields through hands-on, science-inquiry learning experiences</td>
</tr>
<tr>
<td>Programs Offered:</td>
<td><strong>Summer class program (est. 1983)</strong></td>
</tr>
<tr>
<td></td>
<td>• Currently offers over 200 classes ranging from astronomy and rocket building to chemistry, engineering and physics to nature education, sustainability and food systems</td>
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<tr>
<td></td>
<td>• Offers variety of programs for ages 5-18</td>
</tr>
<tr>
<td></td>
<td>• Includes both classroom-based and field-based classes</td>
</tr>
<tr>
<td></td>
<td><strong>Summer Wilderness camps (1989-2011)</strong></td>
</tr>
<tr>
<td></td>
<td>• Consisted of overnight camps for ages 11-17</td>
</tr>
<tr>
<td></td>
<td>• Included trips to Mission: Wolf, Yellowstone, Great Sand Dunes, and other Rocky Mountain area destinations</td>
</tr>
<tr>
<td></td>
<td><strong>Science Explorers &amp; Science from CU (est. 1988)</strong></td>
</tr>
<tr>
<td></td>
<td>• Includes teacher professional development and workshops</td>
</tr>
<tr>
<td></td>
<td>• Collaborates with CU faculty to offer “Science from CU” in local classrooms</td>
</tr>
<tr>
<td></td>
<td><strong>After-School Program (est. 2004)</strong></td>
</tr>
<tr>
<td></td>
<td>• Offers 4-6 week after-school and holiday programs ranging in topics from robotics to snow science and sustainability</td>
</tr>
<tr>
<td>Annual Timeframe:</td>
<td>Year-round (includes all program offered)</td>
</tr>
</tbody>
</table>
CHAPTER V

STUDY FINDINGS

Introduction

In this chapter, I will present my findings in relation to my opening questions and theoretical framework. The framework for this study includes social practice theory’s understanding of identity formation, along with significant life experience (SLE) research findings about experiences in the natural environment that influence lifelong environmental behaviors. I will first offer a brief summary of this framework and its goodness of fit for this study’s context. I will then provide the participant demographics of each program along with program class descriptions that largely emerged from participant interviews. Following these descriptions, I will present the dominant emergent themes from participants’ narratives. From these themes, I will make an argument for how each fits within social practice theory and how this theory helps predict what past SLE research has uncovered. Finally, I will present the specific findings from the narrative interviews, which help support the argument that social practice theory can provide a solid theoretical foundation on which past SLE and future SLE research can rest.

I approached the narrative analysis with an open mind to what emerged from each interview while also paying attention to what emerged with regard to my primary research question: When participants recall program experiences, what experiences remain salient to them and how do they understand those experiences to have shaped them over time, including but not limited to their environmental identity?
In any narrative analysis, it is important to maintain that these stories are unique to the individual and are shaped over time through varied experiences that make the saliency of these programs particular to that individual. As such, I approach generalizing these participants’ experience beyond the confines of this study with caution; in other words, what may have been meaningful and significant to them may not have been for others who participated in these or similar programs.

However, in transcribing, reading and analyzing the text of our conversations, similar experiences within each program began to emerge, shedding light on what each program offered to its students and the long-term influence it has had in their lives. I will not be presenting each individual story or participant, but I will present salient experiences relevant to the emergent themes. I will also examine how these themes relate to social practice theory’s understanding of identity formation and previous SLE findings.

I want to articulate here that I have great respect for each of the programs I have worked with and each possesses its own strengths and limitations; it is not my intent here to hierarchically compare or place one program above another. For the purposes of this study, I felt it was important to explore the implications of these similar, but different programs. Thorne and Wild Bear are two unique and well-established programs within Boulder County and along the Front Range. CUSD is a unique and well-established program as well and is recognized within this community as a resource for children and youth to engage in inquiry-based, hands-on science learning. The inclusion of these programs in this study is not an attempt to rank one program over the other, but an effort to understand the long-term impacts of such programs over the life course of past participants. Are these types of
programs formative? Do these programs contribute to identity? Does this type of learning and experience contribute to environmental stewardship? While there is not space to illuminate each individual experience, it is my hope that the different voices and personal stories can shine through in this analysis and exploration of program participants’ experience.

**Analysis through Theoretical Frameworks of Social Practice Theory & Significant Life Experience Research**

For this analysis, I have used my theoretical framework of identity and social practice theory, along with the findings from SLE research, as a lens through which I have viewed and interpreted the narratives and survey findings. While I proposed that social practice theory and the context of past SLE research would serve as a helpful framework for narrative analysis, I wanted to examine the goodness of fit within the context of this study. To do this, I reviewed the common emergent themes from participants’ narratives to see if and where these themes fit within either context. However, in doing so, I began to realize that when social practice theory is applied to these experiences, the theory quickly begins to embody and explain SLE research findings. I had originally aimed to present the findings under each separate umbrella, but again realized that this presentation would become redundant. Within the context of this study, this process has revealed how social practice theory’s approach to identity formation helps predict what SLE research has found to be consistent across its many years of study findings. As such, I will present the findings within the context of social practice theory’s understanding of identity formation.
Social Practice Theory & Identity Formation

Holland (2003) proposes a social practice theory approach to identity formation through her analysis of environmental identity among environmental groups. Social practice theory understands the role of local cultural and social influences on how people act within those sociocultural spheres as well as how they perceive themselves and others. A key component of Holland’s argument is the formation of identity through action. Her understanding of identity extends beyond beliefs and attitudes and requires that one must take on specific actions as well in order to truly possess an identity related to those beliefs and attitudes. Although Holland’s research does have an environmental focus, social practice theory can also be applied to understand the formation of identity in general, environmental or otherwise.

Additionally, Holland’s (2003) articulation of social practice theory and identity fits well with Clayton’s (2003; 2009; 2012) understanding of environmental identity formation. Along with attitude, beliefs and emotions, behavior or action is an essential component of how a person comes to possess an environmental identity. Both Holland and Clayton understand the influence of the sociocultural locations in which people find themselves and each have identified certain components that seem to contribute to how people come to identify themselves within those locations.

Significant Life Experience

Significant life experience research as it relates to people’s relationship with the natural world has found that across cultures and demographics, there are specific interactions with the natural world that often lead individuals to possess positive attitudes, beliefs, and actions.
towards the natural world. These experiences typically occur over time beginning from an early age and continuing well into adulthood. It is the long-term influence of these experiences that SLE research explores and as such, requires people to reflect on their lives and articulate the influence of their particular experiences. Social practice theory understands the importance and confluence of the history of place, local sociocultural practice, and the thickening of identity over time. It also understands the role of reflection in how an individual comes to view these influences on his or her concept of self. As such, social practice theory largely encompasses the concepts of SLE.

In the following sections, I will review the demographics of program participants, the classes they participated in, and the extent to which their experiences fit within the theoretical framework proposed for this study.

**Thorne Participants & Class Descriptions**

This section includes the demographics and program experience of six former Thorne students. While I did receive limited feedback from the Thorne survey, my analysis for Thorne participants rests in the stories they shared with me during our interviews. At the time of the interviews, the participants ranged in age from 19 to 50 and consisted of five females and one male. All participants identified as Caucasian (Table 6).

| Table 6: Thorne Participant Demographics (n=6) |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| Male            | Female          | Age Range       | Ethnicity       | Year of Participation Range |
| 1               | 5               | 19 – 50 years   | Caucasian       | Early '70s – 2006 |
The focus of Thorne’s programs places an emphasis on place-based environmental education and connecting children to the natural world around them. Under this umbrella, however, is a range of classes that place an emphasis on a particular aspect of the natural world. Among the six interview participants, these topic areas included bird-banding (BB), mud-mucking (MM), water ecology (W), and general nature exploration (NE). With the exception of one, all Thorne participants participated in Thorne programs multiple times within a summer or more than one summer. The age limit for many Thorne programs is 15; however, once students reach age 16, many elect to return as teaching assistants to the programs in which they participated. Table 7 below presents the participants, the classes they recalled participating in and the frequency of their time spent with Thorne.

**Table 7: Thorne participants, classes and frequency (n=6)**

<table>
<thead>
<tr>
<th>Participant*</th>
<th>Class(es)</th>
<th>Frequency (number of summers)</th>
<th>Returned as TA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BB  MM  W  NE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jessie</td>
<td>X</td>
<td>X</td>
<td>1</td>
</tr>
<tr>
<td>Holly</td>
<td></td>
<td>X</td>
<td>1</td>
</tr>
<tr>
<td>Elizabeth</td>
<td>X</td>
<td>X</td>
<td>3</td>
</tr>
<tr>
<td>Madison</td>
<td>X</td>
<td>X</td>
<td>5</td>
</tr>
<tr>
<td>Wyatt</td>
<td></td>
<td>X</td>
<td>4</td>
</tr>
<tr>
<td>Beth</td>
<td>X</td>
<td>X</td>
<td>4</td>
</tr>
</tbody>
</table>

*pseudonym; Bird-banding (BB); Mud-mucking (MM); Water ecology (W); Nature exploration (NE); Teaching Assistant (TA)

The descriptions provided below of the Thorne classes come from my interview with founder Oak Thorne, Thorne staff, class descriptions and my interviews with former Thorne participants.
The bird-banding classes recalled by Thorne participants were often led by Thorne’s founder, Oak Thorne. He is not only a seasoned ornithologist, but he also enjoys sharing his love of birds and the natural world with people young and old. All of the participants in the bird-banding classes mentioned Oak and his presence as being influential in their experience. This class in particular inspired three participants to return as summer teaching assistants for the Thorne program. The bird-banding class includes local bird identification and bird banding, which requires the use of a mist net to safely capture the bird, examine its features up-close, place a band on its foot and safely return it back to its natural surroundings. This aspect of the class resonated with these participants as being a moment filled with wonder, awe and respect for nature as students were allowed to be close to an animal that is often far away and quick to flee.

The mud-mucking class is an exploration in the fine art of mud-pie making, including what mud is made of and what other creatures can be found living and playing in mud. This class served as an opportunity for participants to be in nature, explore its elements and freely PLAY. It is not uncommon for mud-mucking students to return home with mud-masked faces, mud-painted limbs, and mud-stained clothes and shoes – an opportunity to go outside the boundaries of normal and expected child behavior, to get delightfully dirty and come home exhausted with enthusiasm for a feature of nature often overlooked and avoided.

Water ecology includes the exploration of local bodies of water including the hydrological and ecological aspects of these natural features. Water ecology students can be found in local creeks and wetlands looking under rocks for crawdads and invertebrates while also gaining an understanding of where the water comes from, the dynamics of flow and water
conservation. Interview participants who recalled participating in a water ecology class reflected on both the sensory experience and the supportive learning environment provided by Thorne instructors.

Nature exploration embodies many of the other classes offered by Thorne wherein students are exploring outdoors in local open space areas. Students can be found journaling about what they are observing, drawing pictures or telling a story. Students learn to make observations about the natural world, like who or what was there before them by identifying animal scat or tracks, while also learning respect and building awareness for the natural community around them. All of the Thorne participants participated in some level of nature exploration during their time at Thorne.

**Wild Bear Participants & Program Description**

This section includes the demographics and program experience of seven former Wild Bear students. Due to the limited response rate for both the Thorne and CUSD surveys, I decided against conducting a survey with former Wild Bear participants. The entirety of my Wild Bear analysis is based on the stories shared with me during interviews, either in person or over the phone. At the time of the interviews, the participants ranged in age from 20 to 26 years old and consisted of five females and two males. All participants identified as Caucasian (Table 8).

**Table 8: Wild Bear Participant Demographics (n=7)**

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
<th>Age Range</th>
<th>Ethnicity</th>
<th>Year of Participation Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>5</td>
<td>20 – 26 years</td>
<td>Caucasian</td>
<td>1995 – 2003</td>
</tr>
</tbody>
</table>
The Wild Bear program is unique in that it can provide a true year-round experience for its participants, offering after-school programs that coincide with the first day of the school year to summer programs that initiate summer vacation. The entire program is steeped in exploring the local natural world and the summer program often includes themed weeks that focus on specific local flora and fauna. The program is smaller in size with regard to class options when compared to Thorne and CUSD; however, Wild Bear summer themes are close in topic to those offered by Thorne. Wild Bear participants did not mention specific programs or classes, but often recalled specific activities in their after-school and summer program. In their narratives, many referred to themselves as “Wild Bears” – a self-proclaimed status earned by on-going participation in the program. Three of the seven participants reported returning to the program as teaching assistants in their later teen and early adult years, as the age limit for Wild Bear programs is 12 years. Table 9 below presents the participants, the time of year they recalled participating and the frequency of their time spent with Wild Bear.

**Table 9: Wild Bear participants, classes and frequency (n=7)**

<table>
<thead>
<tr>
<th>Participant*</th>
<th>Wild Bear</th>
<th>Frequency (in years)</th>
<th>Returned as TA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>After-school</td>
<td>Summer</td>
<td></td>
</tr>
<tr>
<td>Charlie</td>
<td>X</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Micah</td>
<td>X</td>
<td>X</td>
<td>6</td>
</tr>
<tr>
<td>Jade</td>
<td>X</td>
<td>X</td>
<td>2</td>
</tr>
<tr>
<td>Samantha</td>
<td>X</td>
<td>X</td>
<td>6</td>
</tr>
<tr>
<td>Amanda</td>
<td>X</td>
<td>X</td>
<td>3</td>
</tr>
<tr>
<td>Isabelle</td>
<td>X</td>
<td>X</td>
<td>7</td>
</tr>
<tr>
<td>Natalie</td>
<td>X</td>
<td>X</td>
<td>4</td>
</tr>
</tbody>
</table>

*pseudonyms*
CUSD Participants & Class Descriptions

This section includes the demographics and program experience of eight former CUSD students. I received the greatest response rate for the CUSD survey and will include a limited exploration of those responses as they illuminate the shared stories gathered through interviews. At the time of the interviews, the participants ranged in age from 20 to 33 years old and consisted of five females and three males. All participants identified as Caucasian (Table 10).

Table 10: CUSD Participant Demographics (n=8)

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
<th>Age Range</th>
<th>Ethnicity</th>
<th>Year of Participation Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>5</td>
<td>20 – 33 years</td>
<td>Caucasian</td>
<td>1990 – 2007</td>
</tr>
</tbody>
</table>

Science Discovery programs cover a range of topics from rocket construction and astronomy to engineering and physics, to exploration of local flora and fauna. Of the eight participants interviewed, the array of specific class participation is as follows: a rocket building class (R); a Lego® construction engineering class (ENG); a chemistry-based class (CH); a frogs, snakes and turtles class (FST); and, the wilderness camp (WC). Table 11 below displays participants, the classes they specifically recalled participating in and the frequency of participation.

Table 11: CUSD participants, classes and frequency (n=8)

<table>
<thead>
<tr>
<th>Participant*</th>
<th>Class(es)</th>
<th>Frequency (summers)</th>
<th>Returned as TA/instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theo</td>
<td>ENG, R</td>
<td>1-2</td>
<td></td>
</tr>
<tr>
<td>Brooke</td>
<td>ENG, FST</td>
<td>1-2</td>
<td></td>
</tr>
<tr>
<td>Mike</td>
<td>ENG, R</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Table 11 (cont.)

<table>
<thead>
<tr>
<th></th>
<th>X</th>
<th>X</th>
<th>5</th>
<th>3 summers (WC)</th>
<th>9 summers (WC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anna</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brett</td>
<td>X</td>
<td>X</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sara</td>
<td></td>
<td>X</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meg</td>
<td></td>
<td>X</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emily</td>
<td></td>
<td>X</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*pseudonyms; ENG=Engineering; R=Rockets; CH=Chemistry; WC=wilderness camps; FST=Frogs, snakes & turtles

The rocket building class (R) is one of CUSD’s longest running classes as it was a part of the original core classes offered in the early eighties. The class is known within the program as “Rockets for Junior Astronauts” and was commonly referred to by study participants as the rocket building class. The program takes place in the University of Colorado’s Fiske Planetarium and covers space exploration concepts and the real design of rocket ships sent to space. The week long class places an emphasis on each student designing his or her own rocket ship, made from a cardboard box with the design limited only by one’s imagination. The week’s culminating event is the class’ collective rocket launch, staged in the planetarium on a boom stage that allows for simulation of a rocket lift off into space. Each of the students climb in their rocket ships and prepare for blast off – an experience that no doubt stimulates the senses and rocks the imagination of these young children.

The Lego® construction class (ENG) is also one of CUSD’s long-running classes that takes something familiar to most children and makes it extraordinary. Students learn about problem-solving and critical thinking as they navigate the world of engineering, turning ordinary Legos into an engineered structure that functions in both form and fashion.
Students learn by doing in this class as it requires hands-on manipulation and trial-and-error with their selected Lego structure.

The chemistry classes (CH) cover the basic building blocks of chemistry by exploring common acids and bases such as vinegar, baking soda, and pH indicators made from boiling a cabbage. It too is hands-on, inquiry-based class as students begin to explore the scientific method through predictions, observations and findings.

The frogs, snakes and turtles class (FST) is an exploration in reptilian and amphibian lives, exposing children to these common, but rarely encountered creatures. Students learn about local reptiles and amphibians, their habitat, food sources and life needs. One participant recalled her participation in the class describing the enthusiastic teacher who approached handling these creatures without hesitation and the all too thrilling end of week turtle races.

The wilderness camp (WC) trips began in 1989 and were designed as overnight trips, five to 10 days in length, and included courses for ages 11-17. The trips typically took place in remote wilderness areas in the western United States including Great Sand Dunes National Park and Mission: Wolf in southwestern Colorado to Yellowstone National Park in northwestern Wyoming. These trips were outdoor, experiential learning expeditions wherein the campers slept in tents, carried backpacks, and were assigned daily chores as the trip required. In addition to these tasks, campers often participated in a service-learning component, providing for needs of the various locations they visited. They were given the chance to interact with knowledgeable adults in these areas such as park rangers, wolf sanctuary directors, river guides and ecological specialists.
All of the participants recalled participating at least twice in a CUSD class. Five of the eight participants recalled participating in one or more classes either within one summer or over several summers. Of these, four recalled participating in the same class type, multiple times within a summer; all of these repeated class experiences were held within the wilderness camp program. However, all participants’ ability to recall the exact frequency of classes was limited.

**Common Emergent Themes Across Programs**

As mentioned in the introduction to this chapter, through the process of my narrative analysis of the interviews, I began to notice common emergent themes across programs and participants’ narratives. This section will explore the specific emergent themes revealed in participants’ stories as they relate to each program. In presenting these themes, I calculated the frequency of each theme within each program and across all 21 interview participants. I understand frequency to be the closest measure of saliency based on the recalled experiences of participants. As such, the frequency of these themes helps address my primary research question regarding saliency of experience across programs. I will also explore these themes within the context of social practice theory, as outlined above.

Sixteen consistent themes emerged across programs and participants’ program experience. These themes are directly related to the program and are reflective of what attributes participants ascribed to their program experience. Table 12 below depicts these themes, the frequency distribution across each program and the percentage of participants overall whose experience reflected each theme.
Table 12: Emergent Themes Based on Program Experience

<table>
<thead>
<tr>
<th>Themes:</th>
<th>Thorne (n=6)</th>
<th>CUSD (n=8)</th>
<th>Wild Bear (n=7)</th>
<th>Total (n=21)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hands-on learning</td>
<td>6/6 (100%)</td>
<td>8/8 (100%)</td>
<td>7/7 (100%)</td>
<td>21/21 (100%)</td>
</tr>
<tr>
<td>Instructor/Mentor</td>
<td>5/6 (83%)</td>
<td>7/8 (88%)</td>
<td>6/7 (86%)</td>
<td>18/21 (86%)</td>
</tr>
<tr>
<td>Differed from other learning</td>
<td>3/6 (50%)</td>
<td>8/8 (100%)</td>
<td>6/7 (86%)</td>
<td>17/21 (81%)</td>
</tr>
<tr>
<td>learning environments</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Influenced environmental identity</td>
<td>5/6 (83%)</td>
<td>5/8 (63%)</td>
<td>6/7 (86%)</td>
<td>16/21 (76%)</td>
</tr>
<tr>
<td>Sense of wonder</td>
<td>5/6 (83%)</td>
<td>7/8 (88%)</td>
<td>4/7 (57%)</td>
<td>16/21 (76%)</td>
</tr>
<tr>
<td>Fostered sense of place</td>
<td>5/6 (83%)</td>
<td>5/8 (63%)</td>
<td>6/7 (86%)</td>
<td>16/21 (76%)</td>
</tr>
<tr>
<td>Empowerment/self-efficacy</td>
<td>4/6 (67%)</td>
<td>6/8 (75%)</td>
<td>5/7 (71%)</td>
<td>15/21 (71%)</td>
</tr>
<tr>
<td>Encouraged awareness/mindfulness</td>
<td>4/6 (66%)</td>
<td>6/8 (75%)</td>
<td>5/7 (71%)</td>
<td>15/21 (71%)</td>
</tr>
<tr>
<td>Valued experience as adolescent</td>
<td>4/6 (67%)</td>
<td>5/8 (63%)</td>
<td>4/7 (57%)</td>
<td>13/21 (62%)</td>
</tr>
<tr>
<td>(during or after program)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Empathy/care for other species</td>
<td>4/6 (66%)</td>
<td>3/8 (38%)</td>
<td>6/7 (86%)</td>
<td>13/21 (62%)</td>
</tr>
<tr>
<td>Influence on career/academic choice</td>
<td>3/6 (50%)</td>
<td>5/8 (63%)</td>
<td>4/7 (57%)</td>
<td>12/21 (57%)</td>
</tr>
<tr>
<td>Sense of community</td>
<td>2/6 (33%)</td>
<td>6/8 (75%)</td>
<td>4/7 (57%)</td>
<td>12/21 (57%)</td>
</tr>
<tr>
<td>Socialization with peers</td>
<td>0/6 (0%)</td>
<td>5/8 (63%)</td>
<td>5/7 (71%)</td>
<td>10/21 (48%)</td>
</tr>
<tr>
<td>High regard for environmental identity</td>
<td>4/6 (67%)</td>
<td>4/8 (50%)</td>
<td>2/7 (29%)</td>
<td>10/21 (48%)</td>
</tr>
<tr>
<td>Modeling observed program behavior</td>
<td>3/6 (50%)</td>
<td>3/8 (38%)</td>
<td>3/7 (43%)</td>
<td>9/21 (43%)</td>
</tr>
<tr>
<td>Encouraged creativity</td>
<td>0/6 (0%)</td>
<td>3/8 (38%)</td>
<td>3/7 (43%)</td>
<td>6/21 (29%)</td>
</tr>
</tbody>
</table>
I want to note here that although all of these themes were not present in each narrative, it does not necessarily mean that these themes were absent from participants’ experience. In other words, had I asked directly about these themes, the distribution might have been different. Unless a theme was explicitly mentioned within the participant’s story, I did not record the participant’s experience as reflecting that theme.

In order to understand how social practice theory helps predict and explain SLE research, I will present the 16 emergent themes under the larger umbrella of social practice theory’s approach to identity formation. Because the social practice theory identity components do not function in isolation and quite often occur simultaneously, several of the emergent themes fall under multiple components. Table 13 below provides a visual for how social practice theory encompasses the 16 emergent themes.

**Table 13: Emergent Themes Under Social Practice Theory**

<table>
<thead>
<tr>
<th>Social Practice Theory’s Components of Identity</th>
<th>Emergent Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Environments &amp; Sociocultural Spheres</td>
<td>Hands-on learning</td>
</tr>
<tr>
<td></td>
<td>Instructor/Mentor</td>
</tr>
<tr>
<td></td>
<td>Differed from other learning environments</td>
</tr>
<tr>
<td></td>
<td>Sense of wonder</td>
</tr>
<tr>
<td></td>
<td>Influence on career/academic choice</td>
</tr>
<tr>
<td></td>
<td>Encouraged creativity</td>
</tr>
<tr>
<td></td>
<td>Encouraged awareness/mindfulness</td>
</tr>
<tr>
<td>Flow of Practice (action)</td>
<td>Hands-on learning</td>
</tr>
<tr>
<td></td>
<td>Encouraged creativity</td>
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<td></td>
<td>Sense of wonder</td>
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<td></td>
<td>Emulating observed practices</td>
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<tr>
<td></td>
<td>Empowerment/self-efficacy</td>
</tr>
<tr>
<td></td>
<td>Empathy/care for other species</td>
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</tbody>
</table>
Table 13 (cont.)

| Collective Group Identity & Social Mediation | Encouraged awareness/mindfulness  
|                                             | Differed from other learning environments  
|                                             | Empowerment/self-efficacy  
|                                             | Valued experience as adolescent  
|                                             | Influence on career/academic choice  
|                                             | Sense of community  
|                                             | Socialization with peers  
|                                             | High regard for environmental identity  
| Place in Context                             | Hands-on learning  
|                                             | Influenced environmental identity  
|                                             | Sense of wonder  
|                                             | Fostered sense of place  

As elaborated above, I initially approached this study’s analysis with two lenses, examining the narratives in terms of social practice theory and past SLE research findings. While social practice theory is more all encompassing, I also wanted to present the ways in which the emergent themes map onto past SLE research findings. The emergent themes also have some overlap with multiple past SLE research findings, although not as frequently as with social practice theory. The only emergent theme that was unexplained by past SLE research was the theme “encouraged creativity.” With regard for the 15 remaining emergent themes, Table 14 depicts what past SLE research has found to be salient and significant in the influence of environmental awareness, attitudes, beliefs, and action.
Table 14: Emergent Themes Consistent with Significant Life Experience Research

<table>
<thead>
<tr>
<th>Frequent SLE Research Findings</th>
<th>Emergent Themes</th>
</tr>
</thead>
</table>
| Experience of natural areas                    | Hands-on Learning  
Fostered sense of place 
Sense of wonder 
Influenced environmental identity 
Encouraged mindfulness/awareness             |
| Caregivers (parents, family, mentors, etc.)    | Instructors/mentors 
Influence on career/academic choice 
Encouraged mindfulness/awareness 
High regard for environmental identity       |
| Empathy/care for other species                 | Empathy/care for other species                                                  |
| Nonformal Education                            | Hands-on Learning  
Instructors/mentors  
Differed from other learning environments 
Influence on career/academic choice 
Valued experience as adolescent 
Socialization with peers 
Sense of community 
Empowerment/self-efficacy 
Emulating observed practices                  |

In the following sections, I will begin my review of the narrative findings as encompassed by social practice theory’s explanation of identity formation. When appropriate, I have woven in SLE findings, reminding both myself and the reader of the ways in which this framework has laid a foundation for explaining and predicting these findings.
Situated Learning Environments

Social practice theory places an emphasis on the role of situated learning environments within sociocultural spheres. The ways in which an individual moves through these spheres through action and participation play a role in that individual’s thickening of identity over time. In this study, each of these programs can be thought of as a situated learning environment wherein participants navigate their role and engagement level.

Past SLE research findings suggest that education, both formal and nonformal, can contribute to the influence of life experience. Much of these findings on education, however, are focused on the specific role of mentors or teachers. An interesting finding within this study was how participants often spoke of how much their program experience differed from other learning environments in which they had participated. I identified six emergent themes that fit within the context of learning environments (Table 15).

Table 15: Emergent Themes Related to Learning Environments

<table>
<thead>
<tr>
<th>Learning Environments</th>
<th>6/6 (100%)</th>
<th>8/8 (100%)</th>
<th>7/7 (100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hands-on learning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instructor/Mentor</td>
<td>5/6 (83%)</td>
<td>7/8 (88%)</td>
<td>6/7 (86%)</td>
</tr>
<tr>
<td>Differed from other learning environments</td>
<td>3/6 (50%)</td>
<td>8/8 (100%)</td>
<td>6/7 (86%)</td>
</tr>
<tr>
<td>Sense of wonder</td>
<td>5/6 (83%)</td>
<td>7/8 (88%)</td>
<td>4/7 (57%)</td>
</tr>
<tr>
<td>Influence on career/academic choice</td>
<td>3/6 (50%)</td>
<td>5/8 (63%)</td>
<td>4/7 (57%)</td>
</tr>
<tr>
<td>Encouraged creativity</td>
<td>0/6 (0%)</td>
<td>3/8 (38%)</td>
<td>3/7 (43%)</td>
</tr>
</tbody>
</table>
For three of former Thorne participants, the role of founder Oak Thorne as a mentor proved to be incredibly significant in their experience. While five of the six participants mentioned Thorne instructors in general speaking to their child-friendly ways of instruction and guidance, it was Oak and his bird-banding class that resonated and inspired these three participants to return as teaching assistants to the program.

Beth, a Thorne participant, spoke repeatedly about her admiration for Oak Thorne and the role he has played in her life and in the lives of all of his students:

> Oakleigh Thorne has, I mean, he's been not only the greatest mentor in my life, but I mean, he's just a huge influence. He's got some amazing stories. He's an amazing person and I'm extremely grateful for him starting that Thorne Ecological Institute. (Beth, Thorne)

Madison participated in Thorne programs her entire childhood and returned as a teaching assistant in her later teen years. In addition to the influence the Thorne program has had on her life, she spoke of her admiration and respect for Oak Thorne and his ongoing dedication to the program he created so many years ago:

> I am super impressed with Oak because he can just, like we'll just be walking around and he'll hear a bird and be like “Oh, that's, you know, whatever kind of bird.” He can do it all, like I love Oak. He's amazing [...] it's [Thorne] definitely been a huge part of my life and it's something I'll always think is important and [it] definitely taught me a lot about, not only about nature, but like also about myself. Just about what I like, what I like and what I don't like and I think it helps kids like kind of realize what's important. (Madison, Thorne)

In addition to Oak Thorne’s profound influence on these participants, other participants reflected on the respectful and child-driven approach applied by other Thorne instructors. Elizabeth reflected on this learning environment multiple times within our conversation:

> What I really appreciate about Thorne and my experience with Thorne is that they have respect for kids [...] I remembered taking a stream ecology class, which is kind
of a big heavy topic for a little kid, but they did a really good job presenting the information, helping us understand about the little critters that we found under stones and rocks and how they lived and how the streams worked [...] overall, I think it was hugely successful for me and not only helped me respect the natural world and understand how people study the natural world — and even though I’m not a scientist, I’m not a biologist and not a geologist and I’m not a stream ecologist — those things and those memories helped me be a better and more well-rounded person and helps me bring a lot of perspective to the work that I do. (Elizabeth, Thorne)

As Elizabeth’s story continued to unfold, she shared with me that her respect and admiration for this program and the role it has played in her life has inspired her to enroll her young daughter in Thorne programs. With real emotion and conviction in her voice, she went on to share her hopes for her daughter’s experience with the program:

I hope she takes away something like what I took away which are some very deep, long, penetrating, lasting memories that shape your life and shape the decisions you make every day. And I hope she gets the same thing and I hope she loves nature and, you know, she doesn’t have to be a biologist or a scientist. I don’t really think that’s necessarily important. I think she should do what she wants with her life, but I do hope that she gets some meaning from those classes. And I also think that, once again, I am just impressed with Thorne’s approach to respecting children and to teaching them in a way that treats them like intelligent beings that can make decisions. (Elizabeth, Thorne)

Several other Thorne and Wild Bear participants spoke of a desire to bring their future children to these or similar programs. Their experiences with each have become something quite treasured in their memories and they hope to pass that along.

Wyatt spoke of the patience of Thorne instructors and how being both a shy young person and an eager nature scholar, he felt he connected more with the instructors than his fellow classmates:

I don’t remember any of their names or really even what any of them looked like but I do remember them being really friendly and I remember connecting more with the instructors than with the other students. Like I viewed them as my friends on the journey than my fellow students. And they were really good about that. I don’t
think I remember anything negative about any instructor. It was all really supportive [...] I just wanted to keep learning and I’d be like “tell me more about this,” and “I like this,” and that was kind of why I friended the instructors more than the students. There was more to gain from talking to them than talking to anyone else. (Wyatt, Thorne)

The majority of the Wild Bear participants I spoke with mentioned the role and influence of Jill, program founder and director. In their conversations, it seems that Jill encouraged in her staff and instructors as well the kind of gentle and compassionate learning environment she hoped to create within Wild Bear.

Samantha, a participant of Wild Bear, spoke of the influence Jill has had on her life and her career path to become an educator:

I mean Jill has been a big part of my life, just my whole life. She came to my wedding. When my husband met her, he was like, “Oh, you’re the reason why we have dead bugs on our wall.” (Samantha, Wild Bear)

Micah, one of the original Wild Bears, reflected often on the learning environment encouraged by Jill and the other instructors – one that was compassionate, engaging and open:

I mean Jill is just brilliant at making everyone feel just so special and listened to and I always really wanted to go to Wild Bear. I always looked forward to it. I definitely credit Wild Bear with really just instilling in me a love for nature and love for the outdoors and kind of just an inquisitiveness that like has stayed with me until today. We were always really encouraged to ask questions and one of the things that Jill, also all the instructors, [...] but I can remember as a kid always feeling that my opinion was valid and I never felt like talked down to or that these adults are separate [...] I felt like they were my teachers and my instructors, but that you, I could ask them questions and that my opinions were always valid. (Micah, Wild Bear)

Micah continued, sharing a story of an afternoon at Wild Bear, one filled with a sense of adventure and exploration:
I mean we got to do neat stuff in Wild Bear. I can remember, so the headquarters were in this old high school, the community center in Nederland now, and it was under renovation and so they delivered a huge pile of dirt once [...] they put this enormous pile of dirt in the parking lot outside of it. And so one of the activities Jill did is she buried a bunch of plaster casts of dinosaur bones in this huge pile of dirt that was delivered and for a week we got to be archaeologists. And she had us grid off the pile and do a miniature excavation and it ended with us reconstructing. So, you know, we had to be very methodical and I mean basically doing our own miniature version of an archaeological dig and then trying to reconstruct the skeleton, or the plaster cast of a skeleton, of what Jill had buried in there. And all through it, we were learning about how archaeologists do things and we learned about the Ice Age and we learned about, you know, we were learning about dinosaurs, but we were also learning about geology and natural history and then having to, you know, make hypotheses and think about “Oh well, where did this bone go? What kind of animal was this? Was this a land animal? Was this a flying animal?” So again, there were critical thinking activities, but it was also fun! I mean, you know, you can’t discount the fact that we were digging in this giant mound of dirt and we were digging up dinosaur bones while we were learning it. It was, I wanted to keep coming back because I, because it was really fun. We learned a ton, but it – we had fun doing it. (Micah, Wild Bear)

Micah’s recollection of this experience reveals how the process of inquiry can inspire and remain with learners over a significant amount of time. The Wild Bears exploring this mound of dirt were given gentle guidance from Jill regarding how an archeologist might prepare a similar site. This guidance led to discovery of bones, to problem solving and to real world scenarios. The learning process was made real, tangible and relevant to learners’ lives, inspiring in Micah a sense of wonder, adventure and engagement with the world.

Micah went on to explain how fortunate he feels to have had that educational opportunity at such a young age. He credits Wild Bear and his experience there with where he is today:

I just feel like I was really lucky ‘cause I got to experience so many different things. And I mean even right now – so I’m a PhD student and I’m in science right now – and I really think that it’s because I got exposed to science and to, through the context and the workshops of Wild Bear, that I stuck with that. (Micah, Wild Bear)
Anna, a repeat participant of the CUSD wilderness camp, reflected on how that setting
differed from other learning environments she had experienced:

I mean that was something else that was unique about Science Discovery. I went to
– I think it was maybe in middle school – we went on a school trip to a different
kind of camp, you know, the one the stereotypical like “Oh, you’re out in the
outdoors,” but it’s got like cabins and all the amenities kind of thing. And what
struck me about that was that it wasn’t teaching people how to interact with their
environment appropriately. It was sort of just like “Oh look! You’re in the
wilderness! Let’s run amok.” And that was something that was fundamentally
different about my Science Discovery experience was that there was a lot of respect
given to the environment you were in. (Anna, CUSD)

Throughout her narrative, Anna reflected often on how her experience with the CUSD
wilderness camps differed from other learning environments. She reflected on how it had
been difficult for her to feel connected to her peers or teachers in other educational settings.
However, when participating in the wilderness camps, the setting and the instructors
resonated with her, providing a learning environment that inspired and motivated her:

Well, I think it was also the people that were involved in them. It wasn’t just the
subject matter – the subject matter was what we took back with us – but the kinds of
people that Science Discovery attracted, the kinds of people that Science Discovery
hired, were the kind of people that were, not just worked well with kids, but also
worked well as mentors, not just even, even as teachers, but mentors really. And you
know, no matter what, it was always going to be a fun time. It was, it would be kind
of a road trip experience with people that not only inspired, but also challenged you
to aspire, which is super, really quite important. You don’t find people in education
quite like that, so I think Science Discovery really picked up on some really great
people and the people involved and the quality of the other people that they
introduced us to. There was a lot of interaction too. We’d go outside of just Science
Discovery as a program. We’d meet with people that were very passionate about
their subject, whether they were volunteers or biologist people working in the field.
They were willing to share that kind of information with us. And also I found that it
was really important to be really interactive with this, one of the things that I think
people have a lot of trouble with is they asked themselves “Well, where does this
apply to me in the real world? Does this apply to me at all?” And I think most
people if they’re not really thinking outside of themselves, they, it doesn’t apply to
them. But when it, when you can directly correlate to your life, those changes and
behavior are going to happen, those influences are gonna happen. (Anna, CUSD)
For Anna, this experience was made relevant to her life and connected with an existing aspect of her identity. In doing so, Anna felt an immediate sense of belonging and desire to be a part of the community established by the wilderness camp instructors.

When learning environments are made relevant to students’ lives and own interests, the potential for connection to that setting and access to the knowledge and experience within it appears to increase almost exponentially. All of these participants shared narratives that reflect this connection and demonstrate just how lasting such experiences can be for the student. These types of successful learning environments begin to lay a foundation for learning that is life long and life deep.

**Flow of Practice**

Social practice theory’s approach to identity formation suggests “that personal identities develop in the flow of practice” or action (Holland 2003, p34). I identified six emergent themes related to the flow of practice, behavior or action (Table 16).

**Table 16: Emergent Themes Related to Action/Flow of Practice**

<table>
<thead>
<tr>
<th>Flow of Practice</th>
<th>Thorne (n=6)</th>
<th>CUSD (n=8)</th>
<th>Wild Bear (n=7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hands-on learning</td>
<td>6/6 (100%)</td>
<td>8/8 (100%)</td>
<td>7/7 (100%)</td>
</tr>
<tr>
<td>Encouraged creativity</td>
<td>0/6 (0%)</td>
<td>3/8 (38%)</td>
<td>3/7 (43%)</td>
</tr>
<tr>
<td>Sense of wonder</td>
<td>5/6 (83%)</td>
<td>7/8 (88%)</td>
<td>4/7 (57%)</td>
</tr>
<tr>
<td>Emulating observed practices</td>
<td>3/6 (50%)</td>
<td>3/8 (38%)</td>
<td>3/7 (43%)</td>
</tr>
</tbody>
</table>
While some of the emergent themes appear to intuitively relate to a flow of practice, others are less obvious. However, I think that by presenting participants’ accounts in their own words, one can see that these other themes do express some level of practice and action. Along with the hands-on learning and sense of wonder these programs encouraged, these programs inspired program participants to emulate or “try on” the attitudes, behaviors and practices they observed while participating in the program. Participants reported they often tried-on these new hats outside of the program either at home with family, with their friends, or in other everyday life settings.

Wyatt, a former Thorne participant, recalled how he and his younger brother would often take a stand for local neighborhood wildlife:

And my brother and I would do stupid stuff like on our bicycles, we’d tape little signs on it that would say like “Defenders of Wildlife” - this is a totally true story - we had this huge park behind our house and my brother and I would ride around and just like chase after, when kids would chase after geese and stuff, we’d just like run them down on our bikes. I don’t know how we didn’t get beat up. But that was like what we thought we should do, like “Stop harassing the geese!” And of course the Canadian geese are actually a really irritating species of goose, but that was what we cared about and we thought we were like empowered to do the right thing. And at Thorne is this community of people that care about the same things that we do, so we’re gonna bring justice to the park. And that was just ridiculous. (Wyatt, Thorne)

Sara, a participant of the CUSD wilderness camp, spoke at length about the opportunity to observe behavior and participate in activities that reflected the attitudes of the leaders and the mission of the program overall. While this is certainly a component of socialization and

<table>
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<th>Table 16 (cont.)</th>
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</thead>
<tbody>
<tr>
<td>Empowerment/self-efficacy</td>
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<tr>
<td>Empathy/care for other species</td>
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</table>
group culture as well, the observation of action and the opportunity to also participate in those actions can be formative:

We’re not just given models and leaders to watch, but we’re also given another small group to observe. We’re given a small group of leaders to observe and a small community to observe. And that is also tremendously powerful. They participate in play and we get to participate in all of the group activities, so we are immediately responsible for the well-being of our group, for the well-being of nature. You know, we're responsible for taking care of the world around us and no one else is going to do it if we don’t. Very important. We’re responsible for the well-being of our peer group and our leaders. We take part in chores and cooking and everything and we also get to take part in things like, you know, democratic discussions, or if you know, the group gets in trouble, we all figure it out. You know, at least we feel like we get to be a part of it, which is tremendously important, especially at that age. (Sara, CUSD)

Isabelle, a Wild Bear participant, explained how her childhood interpretation of Wild Bear’s message and the actions she observed from the instructors impacted her family’s mountain property:

Living up in the mountains, we try and take really good care of our forest and our trees on our property and everything. And I remember I wouldn't let my dad cut any trees down that still had green pine needles on them, even though they were mostly dead and needed to be cut down. But I think I got that from just being at Wild Bear and learning how important living things are and you shouldn’t hurt them or anything like that. So for a long time, I wouldn’t let my parents cut dead trees down even if they had a few green pine needles on them. “Oh, they’re still green so they’re still alive. You can’t cut that down.” (Isabelle, Wild Bear)

This component of action, of trying on an identity, of emulating behavior, can become significant for the formation of one’s identity. If the actor enjoyed they way they felt while performing the behavior or felt as though it represented someone they hoped to be, one might assume that if the behavior continues, it certainly can become a part of that actor’s core identity.
Charlie, also a participant of Wild Bear, reflected on the program’s approach to creative expression through nature art which was a unique component of the Wild Bear program:

That’s definitely one thing that I can say is a lot of just comfort and ease of nature and the ability to express it through art. And that’s the thing is, you know, you can write a 100 essays about your experience in nature, but I think art is really, like I said, it’s raw. It’s that more of an energy than data and so that’s I think the really positive thing about here, is that it really allows that, really allows the creative aspect of things and it’s through the instructors and the kids. Everybody gets to be one big ball of creation. (Charlie, Wild Bear)

No other participants of the other nature-based programs mentioned the application of art to express experiences of nature. Several Wild Bear participants mentioned that they still have these art projects hanging in their former childhood bedrooms. These art mementos can serve as reminders to past participants of what they experienced and how that experience has remained with them over the years.

Participants of the CUSD classroom-based classes spoke of how these classes promoted and encouraged creativity through hands-on learning. Theo recalled participating in a couple of the Lego® engineering and rocket building classes. He spoke of the importance and value in letting kids learn by doing, which necessarily stimulates creative and critical thinking:

I think the program really helped kids get excited about robotics at a young age, and just learning by using their hands and their expression of imagination by actually working with the Legos […] I really think that the experience of starting off with Legos – which is a toy that a lot of kids are already familiar with – but then applying that in a way to solve problems with it and think about how you can approach a problem from different directions just by using your hands and putting pieces together in different projects helps students think more spatially. (Theo, CUSD)

At the time of the interview, Theo had received two higher education degrees in engineering. While he was hesitant to fully credit his CUSD experience for his pursuit in engineering, he did believe that this type of experience and learning environment helps foster in children a
sense that they can be successful in fields like engineering and robotics. He went on to say:

Science discovery program can bring cool toys – which to be honest, that’s what engineering is about – to kids and get them excited about it. And, you know, a career in engineering and science to some extent can just be playing with bigger and bigger toys. (Theo, CUSD)

This awareness in action, this realization that one can successfully participate in a field, helps that person envision or identify him or herself as a member of that field.

Brooke, a CUSD rocket class participant, recalled how building her very own rocket ship inspired excitement and creativity:

So I just remember being completely excited and infatuated and just so gung ho to do this thing [build a rocket]. I was a very creative kid and so anything that involved like building or designing or arts I took very seriously […]. Frankly, I don’t know if it really spurred me to be very super interested in science, but it definitely spurred me to just you know that whole wonderment and being excited for the future and spurring creativity […] that definitely was one of the main things I remember from my childhood experiences with that particular camp and now I’m a designer. (Brooke, CUSD)

For Brooke, this experience was one that resonated with the type of learner she considers herself to be and this particular learning environment provided an outlet for her creative expression. She identifies herself as a creative person and this experience reinforced for her that she could succeed as a creative person in the professional world of design.

Mike, a CUSD participant, also recalled participating in the rocket building class and along with the creative process, spoke of the sense of wonder that particular class evoked:

And the whole class was a really interesting creative approach to sort of learning more about space and how, you know, what kind of things are out in space and how to visualize that in the planetarium setting. And so that was a really neat experience and I remember the final presentation […] where everyone was up on the soundstage and he [the instructor] like put on this super low frequency, like really loud rumble, and it shook the entire stage that we were on. And it was really neat
and he had stars flying around on the planetarium screen and that was just a really, really good impressionable experience for me. You know, the fact that I can still remember it pretty clearly I guess is kind of indicative to that. (Mike, CUSD)

Another story Mike shared of his experience with a CUSD class explains how the creative, hands-on approach to learning can stimulate and encourage learners’ innate interests. At the time of our interview, Mike was pursuing a degree in chemistry and describes his first hands-on experience as a child chemist. This excerpt is lengthy, but I think including it in its entirety does the most justice to his experience and the influence he attributes to it:

I think this was my very first introduction to hands-on chemistry […] And so we did like the classic baking soda and vinegar things, but there was one thing that we did – I guess each person in the class put on a final presentation at the end of the class and I remember there were a lot of, well, kind of pretty easy things that people were doing. But the one that I did was – I didn’t really understand the chemistry of it at the time – but it was a demonstration where there was like a story behind it: I guess there was this king and he wanted – and for some reason they served him white wine at dinner – but he really liked red wine a lot better. And so he got his court magician or something to turn it into red wine. And so what I did was I had a beaker of water I guess and there was a pH indicator in the water and the way that the pH meter was set up, would turn red when the pH of the solution was lower. So I made a big show of pouring vinegar into the solution that lowered the pH and then magically the water just turned red. And that was a really cool thing for me to do and it was really neat that there was this kind of creative storytelling aspect behind that too. So that was – I like to say that that really sort of got me interested in chemistry and that’s where I am right now. I’m – I’ve always really been interested in chemistry – and I’m doing that as a profession now, so that’s really cool. (Mike, CUSD)

I find Mike’s recollection particularly interesting given that he currently finds himself in the field of chemistry, identifying himself as a mechanical chemical engineer and as someone interested in applying scientific concepts to real world settings. Mike makes a comment about how others in his class were doing some “pretty easy things” for their final presentation as if to suggest that his was particularly more difficult and more scientific. This is not a criticism of his story, but more to point out that from a very early age, this flow of practice was important for Mike’s identity, particularly how that experience and his success
in the socio-cultural sphere of chemistry from an early age continues to resonate with him today.

Another finding frequently cited within SLE research is related to childhood encounters with animals. This interaction is thought to increase a child’s sense of empathy and care for others. Within these programs, the interaction was often accompanied by care for the animals, which also encouraged a sense of ownership and empowerment for these young caregivers as being entrusted with the care for another creature. The act of caring for another species is supported by social practice theory’s concept of flow of practice and when reinforced and practiced over time, helps to thicken the understanding of self as someone capable of taking care of something outside of one’s self.

Most of Wild Bear’s programs are held out of doors, in the natural world, trekking along local hiking trails and plunking around in streams. However, one of the most frequently mentioned memories of Wild Bear participants included hands-on interaction with rare or unique animals and insects.

I remember there was one time they brought in a boa constrictor, and I got to play with a snake. They brought in tarantulas, and we got to play with tarantulas, just kind of taking the fear out of some animals that are actually not dangerous. And kind of saying, you know, “There’s a tarantula or there’s a spider, and it’s not going to kill you or anything of that sort.” That was kind of a fun experience. (Jade, Wild Bear)

The other thing I remember was the arthropod zoo and all of the different live arthropods that she [Jill] had there and learning about those and having that hands-on experience. Doing that was another big thing that I think really got me interested in science […] being a girl, I know that was like the summer of my third grade year and when I went to fourth grade, I think the only thing I could talk about was bugs. I was kind of like the bug girl because I was so like, “I’ve touched it. I’ve held a giant tarantula and a giant millipede and all of this stuff.” It was kind of - it was definitely a big part of my life. (Samantha, Wild Bear)
Both Jade and Samantha felt that the Wild Bear program resonated with them through these hands-on experiences and remain experiences that they reflect on to this day. Samantha, an educator, explains that her experience with insects as a young child has helped her form connections with her students. She still has the bug collection she made while in Wild Bear holding a special place in her own classroom. She has her students conduct a bug collection as well and shares her childhood experience with them as they construct one of their own. In doing so, Samantha reflects on that experience she has a child, reinforcing its significance over time.

Although Amanda participated repeatedly in Wild Bear, she was much more reserved in sharing her memory, explaining that she did not remember much of her experience. However, her recollection of the Wild Bear animals was one of the first memories she shared with me:

And um, one of them was that there were animals involved in it, particularly like the snake and the hedgehog and millipedes. So animals, not animals you’d see everyday and that was kind of cool. I got to hold the snake a lot. Before I was afraid of snakes so that was a lot of fun. (Amanda, Wild Bear)

Charlie participated in Wild Bear’s summer program for a couple of years and returned after high school to intern. He has served as an instructor with Wild Bear and through this perspective, reflected fondly on his childhood memory. As I cringed through his explanation of snake holding, he explained that had he not had that hands-on, sensory experience as a young child, his reaction would likely be similar to mine:

And I remember she [Jill] had this huge, I think it was this python or a boa constrictor or something. Yeah I know [reacting to my cringing] but that’s the kind of thing if I hadn’t been around those things when I was little, I would be a lot more apprehensive. But snakes are nothing to me - unless they’re like a rattlesnake about the snap at you, it’s no big deal. I will always hold - I love snakes. I’ll hold the cockroaches. And I’ll hold the millipede. Tarantula I will never hold. And the
scorpion I will never hold. But that’s just, I think, that’s just natural protection [...] that’s the thing - I would feel that way I think about those animals too if I wasn't here. (Charlie, Wild Bear)

Micah reflected on the responsibility assigned to them as Wild Bears and how for him, it reflected a sense of collective ownership and sense of competency as a young person:

You know, as a kid you’re not really, you know, you don’t really have very much control or much agency over your life. But having, you know, a responsibility to take care of – it, yeah, it gives you – but it’s more than just a chore. It’s the responsibility [...] like it’s the responsibility to your other, to yourself, and to your other campers I think. Or, I mean, everyone always wanted to have the job to like either feed animals or water the animals, but, which I think that was because the animals were fun, but it’s also, you know, you’re taking care of something and you want to – there’s this sense of like you want to keep Wild Bear nice for everyone else as well. (Micah, Wild Bear)

For these participants, the flow of practice within these learning environments seems to have contributed to the saliency of these experiences and, through the process of reflection, what these experiences have come to mean for them over time.

**Collective Group Identity & Social Mediation**

Another important piece of identity formation within social practice theory is how people engage with a collective group identity of a particular cultural sphere of action. Collective group identity is certainly a part of learning environments and becomes extended by ongoing participation and flow of practice. There are particular identity groups with which people come to associate, or disassociate, themselves. How individuals understand themselves to fit within this group identity contributes to how they also understand their personal identity. As with the above section on flow of practice, if an individual views him or herself as being successful within that identity group, they are more likely to view themselves as possessing that particular identity.
Many findings within SLE research have also discovered the importance of social interactions and the role these play in helping shape experience. Important social groups include family, friends, mentors and organizations. These findings are also well supported within social practice theory’s understanding of identity formation and the function of sociocultural spheres and group identity. I identified nine emergent themes that fit within this understanding of collective group identity and social mediation (Table 17).

<table>
<thead>
<tr>
<th>Collective Group Identity</th>
<th>Thorne (n=6)</th>
<th>CUSD (n=8)</th>
<th>Wild Bear (n=7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differed from other learning environments</td>
<td>3/6 (50%)</td>
<td>8/8 (100%)</td>
<td>6/7 (86%)</td>
</tr>
<tr>
<td>Encouraged awareness/mindfulness</td>
<td>4/6 (66%)</td>
<td>6/8 (75%)</td>
<td>5/7 (71%)</td>
</tr>
<tr>
<td>Empowerment/self-efficacy</td>
<td>4/6 (67%)</td>
<td>6/8 (75%)</td>
<td>5/7 (71%)</td>
</tr>
<tr>
<td>Encouraged awareness/mindfulness</td>
<td>4/6 (66%)</td>
<td>6/8 (75%)</td>
<td>5/7 (71%)</td>
</tr>
<tr>
<td>Valued experience as adolescent (during or after program)</td>
<td>4/6 (67%)</td>
<td>6/8 (75%)</td>
<td>4/7 (57%)</td>
</tr>
<tr>
<td>Influence on career/academic choice</td>
<td>3/6 (50%)</td>
<td>5/8 (63%)</td>
<td>4/7 (57%)</td>
</tr>
<tr>
<td>Sense of community</td>
<td>2/6 (33%)</td>
<td>6/8 (75%)</td>
<td>4/7 (57%)</td>
</tr>
<tr>
<td>Socialization with peers</td>
<td>0/6 (0%)</td>
<td>5/8 (63%)</td>
<td>5/7 (71%)</td>
</tr>
<tr>
<td>High regard for environmental identity</td>
<td>4/6 (67%)</td>
<td>4/8 (50%)</td>
<td>2/7 (29%)</td>
</tr>
</tbody>
</table>

Among Thorne, Wild Bear and CUSD wilderness camp participants was a strong sense of community, connection, family and belonging that they felt was promoted and supported by
program staff. Their narratives reflected on the value of having a sense of belonging outside of their immediate family and how this connection enhanced their experience with the program.

Micah was a regular Wild Bear participant from the program’s beginning. He reflected on the sense of community and sense of belonging he felt in the program, which he attributed to being an “original Wild Bear”:

I was one of the original wild bears. I was one of the first people who participated in the program […] And I can remember that in the beginning, we just went over to Jill’s house in old town Nederland and it was me and a couple of other kids my age that I’m still friends with. And we would go over and learn and it just really fostered this great sense of, kind of belonging, because there was this small group and we were having fun together. And then as it grew into what Wild Bear is now, you know, the after school program with camps and workshops, I was right there along with that. I think I went to the after school program almost every day when I was in elementary school […] But I was always excited to go. We would get in the big blue van and then trek over to the old community center in Nederland and it was just always exciting to be learning. (Micah, Wild Bear)

Micah’s sense of belonging also seems to echo a real sense of ownership in the Wild Bear program overall, which can certainly be a component of belonging. Over the years, he began to feel invested in the program, and in our conversation, it was clear that he still feels that connection to Wild Bear many years later. I understand Micah’s narrative to depict a sense of belonging within Wild Bear participants’ collective group identity. Micah continued to reflect:

I mean Wild Bear was just like, it was this space where you really felt like you belonged. You felt, I felt totally safe, which is good because again I did spend so much time there after school and during the summer. And you felt like you’re kind of part of something special. Like we, because after school we would wait for the van, for Jill to come in the van and pick us up and then take us over for the day’s activities, but while we’re all waiting together to get picked up, it really did feel like “Yeah! This is great! We’re the Wild Bears and we’re gonna go learn some stuff and have some fun today!” And I think that just was reflected, and how even in the day-to-day activities in the camp, how we would have our chores and our cleaning up – it
was all because we were the Wild Bears. We were this group; there were expectations and we had our jobs. Some of us had the job to take care of the different critters and feed the cockroaches or feed the snake. It was just a really neat, just a really neat and really wonderful experience. (Micah, Wild Bear)

In addition the care for the Wild Bear animals, Micah reflected on how empowered he felt as a young Wild Bear to participate in the River Watch Program along Boulder Creek:

> When I was older I kind of, I started doing this program called the River Watch Program where me and another student at Wild Bear, we went to a workshop and got trained in how to do water quality monitoring and then we started doing water quality monitoring at a creek in Nederland, in the South Boulder Creek. And so that was really neat because again it was this kind of thing where […] we learned a skill that got us kind of, had a project and really got to take ownership of it, which it was, it was cool was really cool for, as a, you know, as an elementary school age kid to be given that kind of responsibility. Because we’re collecting data and then sending it off and it was an introduction to a scientific project. And it was, you know, as a fifth-grader to be involved in something that is important is a cool thing. (Micah, Wild Bear)

Emily was a repeated participant in the CUSD wilderness camps over much of her adolescence, often participating in multiple trips within one summer. Emily participated in CUSD for approximately seven years from the summer after fifth grade through her junior year in high school. She also returned to the program to serve as an instructor for several more years during and after college. Her memories were vivid and in her voice I could hear genuine enthusiasm and love for the program. While the wilderness camps instilled in her a love for the natural world, she spoke often of the people involved in the program. She spoke of how, over the course of a week, a very special bond was formed among the entire group, mentors and campers alike:

> And we’d meet the night before and bring all of our bags and get the van packed, sort of look around and see who was coming, and then, and then off we’d go. And, you know, it was always sort of a long drive, but in, in reality, it was a blessing in disguise, because we got, we as campers, got to know each other and just sort of bond in the van. And then we’d show up to wherever we were going, and we were off. And I was never homesick. I never felt in danger or anything like that. It was
just, I don’t know – it just, it brings a smile to my face. I have such, such great memories of being a camper as a kid. (Emily, CUSD)

Emily went on to share one of her favorite parts of the camp, the closing ceremony, which was a collective story telling by the group of the trip’s events:

The sort of culminating activity, every single trip, was the closing ceremony. So it was always a really special time to share how you were feeling, what you learned, what you gained, how you changed, how you grew. And sometimes kids would cry and, sometimes, you know, we would laugh. And it was just nice to sort of listen to what, you know, we were all thinking or enjoying. And as an adult, it was really special to sort of look back and be like, “Oh, you know, the kids really enjoyed the solo time.” That’s the thing I always really liked as a camper. And sort of before that closing ceremony started, we would go around in a circle, and we’d start from day one. Someone would start, “Well, we met at CU and we all, we played a name game, and we tossed a Koosh. And then we got in the van and we drove and we stopped for lunch at that park, and we, you know, played another game, and remember, like, so-and-so dropped their sandwich in the grass” and everyone would laugh, and then you’d stop talking and they would pass it on to the next person. And the next person would continue the story and you would go, and you’d talk all the way through your trip, and – uh, kind of getting, like, choked up – And you, you know, the last person would finish with sort of like, “Okay, we woke up this morning, and we had breakfast, and we took down our tents, you know, we packed the van, and here we are, sort of, like, ready to go.” It was the very, very last thing you did before you left, the last campfire, this closing sort of ceremony, reflection. (Emily, CUSD)

For Emily, her experience within these camps served as an opportunity to be a part of a shared story, a collective group – a group of strangers who became each other’s family over a week of trial, tribulation and celebration. She felt that as a group they developed a bond that no one else could sever or take away, a bond and memories she has cherished over the years. This no doubt helped her to not only identify as a member of this group, but also as someone who could accomplish and succeed at the tasks set before her, with a community of support by her side.
Madison, a repeat participant of Thorne throughout her childhood, reflected on the sense of family she felt from the members of the Thorne community:

It’s like Thorne just really feels like a big family […] I feel like the administrators and instructors really take the time to get to know the kids. And get to know the families because there are kids that even I recognize who come back like every summer. And [staff members], you know, they will know the kids and will be like “Hey! How’s it going!” and there are definitely kids that go to camp every week of the summer. And, I don’t know, I think it’s like super important for kids to have that […] I think it’s good to like have kind of a family away from your family. And yeah, definitely, they like teach you to be respectful of nature. ‘Cause like a lot of kids don’t know. I think it should be a big part of kids’ lives. Like I love being outside, I like being in nature, I like hiking. And Thorne, obviously like I said my parents do that, but Thorne helped me appreciate nature even more than just going hiking with my parents. (Madison, Thorne)

For Madison, she valued the sense of community because it served as a space to feel valued, validated, and cared for by others outside of her immediate family. She felt as though the community of Thorne had extended and reinforced the messages and values she received at home free of the common stresses often associated with family life.

Related to collective group identity, a theme emerged across programs that was not particularly strong, but interesting nonetheless. Participants from each program, either when asked or through their own accounts, reflected on environmental stewardship with a tone of reverence and respect. I identified this theme as “high regard for environmental identity.” What stood out about this theme within their narratives was their reluctance to identify themselves as stewards of the Earth or as individuals who take specific actions on behalf of the environment.

When I asked Holly, a former participant of Thorne, whether or not she thought of herself as an environmental steward, she gave the following response:
Well, I would I would love to think of myself that way and I certainly, that’s a major place where I give money, you know, to The Nature Conservancy and that sort of thing. (Holly, Thorne)

Wyatt, a Thorne participant as well, had a similar response when asked about environmental stewardship and what it means to him:

I would, I would hope that I could be considered in that way. It’s not something that’s always at the forefront of my mind, but it’s definitely something that I’m conscious about caring for [...] to the extreme end, there are people who dedicate their lives to it. There’s people who use their lives to promote the environment as a cause and that’s something that in some senses I wish I could do, but I know I can’t because I don’t have the time for it. And I think a true environmental steward is someone who really devotes themselves to it and makes the environment their cause. And there’s a lot of people who do that, especially here. But I think that’s the ideal and everyone should strive to have some element of that in their life. Whereas hardly anyone is ever going to be actually able to do that and those who are, I think are in a way lucky. (Wyatt, Thorne)

Charlie, a Wild Bear participant, was quick to identify with being an environmental steward, but went on to elaborate on his response as if he was almost, but not quite, there:

Oh yeah. Oh yeah. Obviously, you know, I mean there are some things that I could do better. I could always [...] we could all do better. But, I, at least the seed was planted and that’s the thing is as I get older, I will get better. And, you know, as these kids get older, they will get better. But it, I would say, yeah I’m a steward. I’m a gentle steward, a gentle giant steward. But yeah, I definitely advocate for my mother. (Charlie, Wild Bear)

Anna, a CUSD wilderness camp participant, had reservation with this identification as well. She went on to draw examples of what embodies the concept of an environmental steward arguing that one does not have to be a perfect steward to be considered one:

I try my best. As I said, you know, there’s always, it’s one of those things that you have to balance it too [...] So I definitely try my best, but there is, there are some things that I miss out on [...] I think just having basic awareness is really important. Like I know that a lot of people, there’s this idea out there right now that people think and they fall into this state of despair [...] but I think that just by, and not just being aware of it, but also being like, “Well, yes, I can make a small difference.” Even if you’re not the perfect environmental steward, you know, just generally paying attention like you don’t drop your plastic wrapper or like generally don’t use
plastic bags, if you can avoid it. You know, just small things like that on a global scale, do fundamentally make a difference. And I think that even if you’re not, you know, the super environmentalist, those tiny little decisions that you make can fundamentally make a big difference. (Anna, CUSD)

Each of these participants attributed their current appreciation for nature and the environment at least in part to their program participation.

In attempting to understand the role of a collective group identity and social mediation in identity formation, I view these shared narratives as successfully depicting how participation in a group can contribute to one’s sense of belonging and sense of place within that sociocultural sphere. This successful participation, when reinforced over time and through repetition, can contribute to identification with that group.

**Place in Context**

Social practice theory’s approach to identity formation includes within it attention to place and the sociocultural practices particular to the physical and built environments. Clayton (2012) also supports this influence of place as it relates to the development of an environmental identity. The role of place also emerges within SLE findings, with particular attention paid to the experience of natural areas. I identified four emergent themes that seemed to resonate with social practice theory’s understanding of place (Table 18).
Table 18: Emergent Themes Related to Place in Context

<table>
<thead>
<tr>
<th>Place in Context</th>
<th>Thorne (n=6)</th>
<th>CUSD (n=8)</th>
<th>Wild Bear (n=7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hands-on learning</td>
<td>6/6 (100%)</td>
<td>8/8 (100%)</td>
<td>7/7 (100%)</td>
</tr>
<tr>
<td>Influenced environmental identity</td>
<td>5/6 (83%)</td>
<td>6/8 (75%)</td>
<td>6/7 (86%)</td>
</tr>
<tr>
<td>Sense of wonder</td>
<td>5/6 (83%)</td>
<td>7/8 (88%)</td>
<td>4/7 (57%)</td>
</tr>
<tr>
<td>Fostered sense of place</td>
<td>5/6 (83%)</td>
<td>5/8 (63%)</td>
<td>6/7 (86%)</td>
</tr>
</tbody>
</table>

Participants who cited an experience in natural areas also referred to how that experience fostered a sense of wonder and sense of place. There were particular passages from several different participant narratives that reflected on these influences. Their own words articulate far better than I can the lasting influence of these experiences.

All of the Thorne and Wild Bear participants recalled experiences that were engaged in the natural world, sensory-based and hands-on. Participants of the CUSD wilderness camp also reflected on their experience as one that was unique because of its natural and outdoor setting. Due to the overnight and extended stay setting, the wilderness camp program fostered the most direct connection to nature and many participants reflected on that extended time as something significant in their experience. Much of it focused on the socialization aspect of being in nature with peers, but a few reflected on how they appreciated that time as it was unlike any other experience they had known prior.

Brett participated in both CUSD classroom classes and the wilderness camp. However, he credits the wilderness camp for being particularly influential in his life. He returned to the
wilderness camp as a teaching assistant during his college and post-college years. Brett is currently an environmental and outdoor educator who possesses a deep conviction for his work, firmly believing in what it can offer young people and the world:

But for me, those, the trips I went on in middle school were hugely formative and I didn’t really realize it until I was leading the same trips again. And there was one moment actually where I was at Sand Dunes National Park, climbing the highest sand dunes in North America and from there – it is an awful climb, it’s all steep sand – but the best part about it is that you can run or roll back down. And I remember sitting on top of the dunes, standing and just watching these fourth and fifth-graders just tumble down the sand dunes and they are having the best time in the world. And it kind of clicked in my head that that’s like, those experiences were what drew me in that direction in life and that was really cool. And so I really believe in what I’m doing […] it makes a difference. (Brett, CUSD)

For Brett, this experience both as a child and young adult, situated in a particular place, helped him understand where he stands on his life path. It was an experience that as a young adolescent provided a sense of wonder and adventure that in a sense drew him back as an adult several years later.

Emily, a participant of CUSD wilderness camps who was outlined above, spoke of the deep appreciation for the natural world that was fostered by these trips:

One thing I loved that we always did was, like, a night hike. So we’d put on, you know, flashlights, or we wouldn’t put on flashlights if the moon was bright enough. And we would just go for an awesome hike and we did part of it like a silent hike. So we could just sort of listen to whatever was going on around us, and, you know, it was a lot of that just discovery. You know, listening: what do you hear? What do you notice? What do you feel? (Emily, CUSD)

She also reflected on how these trip leaders carved out time for students to spend alone in nature, commonly referred to as “solo time” or “solos.” She was the only wilderness camp participant who reflected directly on this experience as something she continues to value:

The neatest thing, getting reflection being an adult, looking back, that Science Discovery did, is something that was really important was having the solo time
This solo time provided a valuable source of reflection during the program experience, which I view as particularly unique when compared to other life experiences. I see this as adding significant value to the trip for these young adolescents as a time to make meaning while in the midst of an experience.

Elizabeth participated in Thorne programs in the eighties and at the time of our interview, was in her late thirties. Elizabeth opened her narrative by explaining that she considers Thorne to be one of the top four most influential experiences of her life. She spoke fondly of her experience with Thorne, her hope for her young daughter’s participation in Thorne, and showed real emotion in speaking about her concern and care for the natural world. She grew up in Boulder until college and after several years of living out of state, relocated back to Boulder with her own family. The narrative she shared with me reflected how, for her, Thorne programs had helped reinforce a sense of place and appreciation for the natural world. She recalled her experience with a Thorne geology class and jokingly explained how precious her acquired rock collection was to her:

I remember a couple of programs specifically. One was a geology class and I loved it! I loved it! And I still remember so much about it – I couldn’t have been that old – but I remember learning about the Hogbacks; I remember learning about different types of rocks; I remember learning about the geology of the Front Range [...] I got a rock collection during that class that was very special to me. And because it was a rock collection, I think my mother said I had to keep it in the garage. And when my parents were getting divorced, they cleaned out the garage and my rock collection was there. And my father threw it out and I have been grief stricken ever since. It was that important to me. It really, really was something I’ve never forgiven my father for. (Elizabeth, Thorne)
Elizabeth’s narrative includes within it specific references to the local natural places that she explored within Boulder County. She was drawn back to Boulder County years later, likely for a variety of reasons, but this childhood experience and development of an understanding of the place in which she lived just might have been a part of that decision-making process.

For Charlie, a Wild Bear participant, his sense of place came both from his time at Wild Bear and from growing-up in Nederland. He spoke of how Wild Bear, as a place, was somewhere he wanted to be – a place that was inviting and accepting – filled with caring people who made it so:

Mostly it was just a very simple, easy, loving place to be in the summer […] But when I got older and I ran into Jill again and I would run into her in town and it would still just be there – just the education that I got from that really simple, easy approach and just something that I positively took with me […] Wild Bear was never something that I really ever had any negative connotation with and that is something that I will always remember. (Charlie, Wild Bear)

He also spoke of how Nederland seemed to reinforce the message and mission of Wild Bear and vice versa:

That’s the thing is that I love, I really do love this place. [Nederland] ‘Cause, you know, you go to the big city, go to a place and they’re just weird and everybody’s so fast and just unwilling to take a step back. But you come here and everybody’s taken a step back. Everybody’s, you know, you can call it “island time,” but it’s a little more productive than that. But it’s a family, it’s a big family and then you come in here [Wild Bear] and it really is a family […] and that’s kind of like how town is. Like, well, I go in anywhere and you just, you know so many people. And that’s the thing, you know, and a lot of people are just so annoyed by it, but it’s, you know, it’s cool. People know me. And people remember me. And you know it’s, everybody’s memorable here. And everybody’s appreciated. And that’s the, everybody knows your name. So it’s kind of a little bit of a Cheers thing. So yeah, I would say that it’s been nothing but good […]

This place [Nederland] is very conscientious. They’re very aware and that’s the other cool thing is that, you know, once you step out of this [Wild Bear’s] door, in some places it could be nobody really cares. But you step out here and everywhere you go, people know and they – you know, we [Wild Bear] have kind of a mission to you know educate and all that – but people kind of live by that mission without even
really being here. And that’s the cool thing is that it’s kind of like a town mission besides Wild Bear’s. (Charlie, Wild Bear)

Charlie also spoke of how his ongoing participation with Wild Bear, as both a child and young adult, has influenced his attitude and beliefs towards the world, with particular regard for that natural environment. I understand this to be an influence on Charlie’s greater sense of place and his role in the “big picture”:

I think that that’s what I would say influenced me the most is just appreciation for the big picture. Appreciation for that, you know, even if you are the only one doing these things, you know recycling or, you know, doing these eco-friendly things, you’re still, you’re making an impact. And you’re creating an energy that is, you know, gonna outlive you […] you know, five years ago, if I had gone down to the woods by my house and just kind of took a stroll, it would have been, you know, walking in the woods. It would’ve been just something I’ve done for a while. But after this, it’s just, now it’s, you know that plant or you know that track and you know what causes the swamp compared to the river and you can just hear it – you know, all the things that you’ve learned. (Charlie, Wild Bear)

I have included several excerpts from Charlie’s narrative because I think his reflection wholly embraces the influence of place, both in terms of the physical place and the socio-cultural place that is emphasized by social practice theory. Had Charlie participated in a similar program in a different location outside of Wild Bear and Nederland, his experience and its overall influence would have likely been quite different from the one he describes.

Holly, who was in her early 50s at the time of the interview, was able to share her limited memory and experience with Thorne with remarkable detail. She explained that she was very young when she participated with Thorne and she could not recall whether or not it was a one time or repeated experience. However, she recalled with detail the field trip she experienced, explaining details of the landscape around her. The two most vivid memories of that day were in the hands-on collection and observation of owl feathers and pellets:
I remember it was very dry with a lot of dry grass and we were searching for interesting things and I have two specific memories of things we found. The first thing was that we found three owl feathers. They were really beautiful; they were very soft; they were almost like fur, really. They were gray and white and they had white spots on them and in fact I still have these owl feathers. The second thing I specifically remember finding was a regurgitated owl pellet, which had bones and fur and stuff of a mouse that the owl had spit up. And I thought that this was just absolutely fascinating and I was very interested in it in that it was about the same size as a mouse. I thought it was interesting that this stuff the owl spit back up was about the size of what he ate. I've just always remembered that and I told my son about how owls spit back up the remnants of what they can't digest. (Holly, Thorne)

This recollection was particularly striking to me in that she mentioned she did not have much to share in terms of memory, but what she could share was vivid and detailed. In hearing Holly tell the story, I almost felt as if I had been there as well due to the descriptive and detailed nature of her memory.

Wyatt, a young man in his early twenties, also recalled in detail a sensory-based experience with Thorne during his participation in a water ecology class. His group was visiting a local wetland pond at Thorne’s Waterton Canyon site in Littleton, Colorado and the group was encouraged to explore the wetland. Although he now recalls the experience with laughter, at the time it was a valuable and sobering learning experience:

I distinctly remember everyone trying to catch crawdads. And it was just this awesome experience to catch a crawdad and only one kid caught one out of our group of 15. And the fact that an animal that looked that weird existed was just the coolest thing for all the kids. And then we all freaked out when it pinched the kid. And he screamed and threw it, just took off running and then never wanted to see a crawdad again. And then every time we'd step into a marsh again, we'd be acutely aware of the fact that there are these creepy things around us – and that, hey that affects me today. I don't like walking in marshy water because there could be crawdads in it and I don't like them. I don't like them anymore. (Wyatt, Thorne)

This experience was particularly profound for Wyatt as it continues to resonate with him, causing a near visceral reaction anytime he considers entering marshy or murky water. This
memory for Wyatt recalls an experience that was hands-on, direct, sensory-based and unlike any other prior experience he had had with water.

Wyatt’s sensory experience of Thorne went beyond the confines of marshy water. Very early on in sharing his story, Wyatt described his experience and memory of the canyon where he participated in the Thorne programs. The canyon is filled with Cottonwood trees – a species of tree whose leaves are particularly magical in the wind:

I kind of have memories of the smells and sights of being in Waterton Canyon, being around all the trees and hearing the wind rush through all the trees [...] And for instance, even though we live in Boulder and I haven’t been down south of Denver in like seven years, if I heard that something was threatening Waterton Canyon, it would be something that I would be interested in protecting. (Wyatt, Thorne)

This sensory experience is closely connected to the sense of place Thorne helped foster in Wyatt and I encouraged Wyatt to elaborate on this point specifically, asking whether or not Waterton Canyon had encouraged in him a sense of place:

Absolutely. Absolutely. I always tried to draw what I was seeing because it was something I always wanted to go back to – like sitting underneath one tree and looking at this creek, or sitting underneath that tree, looking this way – was always something that I wanted to capture and stay in. (Wyatt, Thorne)

Jessie explained that her first experience with Thorne was also her first experience with banding-birds. While she grew-up appreciating birds from her mother’s interests, she further explained that this experience was unlike any other she had ever known:

So holding my first bird was just a crazy, like a mind-blowing experience. I mean I’d never done something like that at all and just like having the opportunity to be involved with something that scientific and just the national perspective of bird banding and the use of information to track migratory patterns and all of that really interesting stuff. Just even when I was younger, I could tell that it was really unusual for a program to do something like this. I mean most adults have never had the opportunity to hold a wild bird or to band it and track it for science and just getting that experience at such a young age definitely opened my mind to science and taught me a lot really quickly. (Jessie, Thorne)
While this experience may have built off of a previous set of experiences with birds, Jessie attributes the profoundness of that experience to more than a prior appreciation. She explained that it was the first day camp she had been to that she had not called her parents mid-day to pick her up. There was something exceptional in her experience with the program and the sensory experience she gained.

Beth also participated in Thorne’s bird-banding class both as a child and later a teaching assistant. Her narrative articulates the way hands-on learning can also foster a true and exciting sense of wonder for the natural world:

I mean it’s a fascinating program for just the fact that we’re getting to this program that monitors birds, specific types, throughout the world and throughout the U.S. and how far they migrate. I mean it’s a pretty specific little program that I don’t think many kids can get the chance to do. I mean, I’ve never heard of that before, just the chance to catch birds and birds are something that you see and are not something that you can handle […] it just shows you what they’re like up close and personal and how delicate and how beautiful they really are up close. And that’s not something you could see because they’re one of the few creatures we can’t really catch. Like, if I was a little kid, I could still do it with toads and frogs and salamanders, crickets. There’s all those little things. They’re very easy to catch and handle and see up close in person, but getting the chance to mist net these birds and handle them, it’s pretty spectacular. You see that amazement in the little kid’s eyes and seeing when he [Oak] takes a barn swallow for instance and he’s like: “Here, listen to the heartbeat and take a guess how many or how high their temperature is,” and they’re just blown away. I mean it’s pretty amazing from a student perspective and from the teacher perspective. (Beth, Thorne)

Beth’s reflection touches on a deep appreciation for the experience she had while participating in Thorne programs. She later explains the value in being able to reflect on that as an adult and the full appreciation she garnered while serving as a teaching assistant. For Beth, this experience has played a significant role in her own career path and her pursuit of jobs within ecological management and outdoor recreational services.
Isabelle spoke about the value of the hands-on learning she experienced while in Wild Bear programs, particularly for the type of learner she recognizes herself to be:

Well, looking back and just kind of walking around the trails today, now that I’m 22-years-old, I still remember how to like identify trees or identify different insects or animals and I like looking at pinecones. “Ah, that’s a Ponderosa pine tree pinecone!” […] I’m more of a visual or a kinesthetic learner so moving and actually touching the things and actually seeing it helps me remember. (Isabelle, Wild Bear)

When considering together the influence of learning environments, flow of practice, collective group identity, social mediation, and place in context, one can begin to see how these components work in harmony to contribute to the overall meaning, saliency and significance of experience. One can also begin to understand how the saliency of experience can begin to thicken over time, reinforced through practice and gradually integrated into a sense of self.

**CUSD Survey Results**

As discussed in the methodology chapter, the purpose of this survey was to 1) understand program experience and, 2) explore the influence of these experiences on environmental stewardship identity. The intended purpose of this survey was to understand general experience trends from past program participants. However, the response rate for the CUSD survey was just shy of 4% and thus does not represent a significant portion of my findings for this study. From the results of the survey for CUSD, I conducted follow-up interviews with five of the 21 respondents. While limited, I believe these survey findings provide interesting insights into how early experiences with hands-on science learning can influence participants over time.
Survey Responses to Program Experience

Below I provide a summary of the survey findings separated into tables and in the order in which these questions were asked within the online survey (Appendix C). Table 19 below includes the distribution of CUSD survey responses directly related to program experience.

Table 19: CUSD Survey Responses to Program Experience (n=21)

<table>
<thead>
<tr>
<th>“Based on my experiences with this program, I feel that…”</th>
<th>“completely true of me” or “true of me”</th>
<th>“neither true nor untrue” or “not true of me” or “not at all true of me”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program promoted: creativity</td>
<td>19</td>
<td>2</td>
</tr>
<tr>
<td>Support from parents/caregivers</td>
<td>20</td>
<td>1</td>
</tr>
<tr>
<td>Hands-on learning promoted science understanding</td>
<td>19</td>
<td>2</td>
</tr>
<tr>
<td>Positively influenced attitude towards science</td>
<td>20</td>
<td>1</td>
</tr>
<tr>
<td>Exposure to science career paths</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Influenced academic study</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>Self-initiative, taking action on own</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Improving the environment</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>Current environmental attitudes and actions</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>Increased interest in environmental issues</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>Boulder County influence on current environmental attitudes and actions</td>
<td>18</td>
<td>3</td>
</tr>
</tbody>
</table>
Survey participants included eight males and 13 females who ranged in age from 18 to 28 years at the time of the survey. The survey also asked participants to identify their main ethnic or racial heritage by selecting from a pre-determined list: “European-American/white;” “African-American/black;” “Hispanic-American;” “Native American/First Nations/American Indian;” “Asian-American;” or, “Other.” Nineteen respondents identified as “European-American/white” and two identified as “Other.” Two-thirds of respondents (14/21) reported that they have held or currently hold a job in a science-related field.

Fifteen out of 21 respondents reported participating in a CUSD program that included “nature exploration” and/or “wilderness-backpacking.” While nearly three-quarters of respondents reported participating at least once in either nature exploration and/or wilderness-backpacking programs, only six out of 15 of these respondents credited the program for encouraging environmental stewardship.

These six respondents also reported that they frequently reflect on their experience with Science Discovery, which may help explain why they view the program as being influential to their current environmental identity. In Holland’s (2003) approach to social practice theory, she discusses the importance of “history in person” as a part of one’s identity. Proponents of narrative inquiry argue that reflection on experience is key to understanding the influence of that experience on one’s identity over time (Elliot, 2005; Mishler, 1986; Seidman, 1998; Webster & Mertova, 2007). In turn, Clayton (2012, p168) argues that time spent in natural settings can help “contribute to self understanding.” The reciprocal relationship between reflection and identity may help explain why these respondents reflect frequently on their
experience as it is a part of who they have become. Table 20 displays these six respondents’
remarks.

**Table 20: Reflection on Experience**

<table>
<thead>
<tr>
<th>“Have you reflected on this experience since? If so, how and why?”</th>
</tr>
</thead>
<tbody>
<tr>
<td>“My experience as a student with Science Discovery dramatically shaped my life, though I did not realize it until years later.”</td>
</tr>
<tr>
<td>“This program is the most important influence in my current life today.”</td>
</tr>
<tr>
<td>“I plan to major in biology in large part due to these camps.”</td>
</tr>
<tr>
<td>“I have positive memories of taking Ponds and Streams camp. I reflect on things I did and from time to time remember facts that were learned through this camp.”</td>
</tr>
<tr>
<td>“I constantly reflect on my time with Science Disco […] When I leave work I frequently watch the mountains on the drive home and remember my time as a young adult, learning about myself and others and the world around me, in the woods.”</td>
</tr>
<tr>
<td>“Yes. In recent years I have had a ‘reawakening’ and become more connected to nature, and many memories and knowledge from SciDisco have come flooding back.”</td>
</tr>
</tbody>
</table>

Eighteen out of 21 participants believed that residence in Boulder County influenced their current environmental attitudes and actions. Of these, 17 reported living in Boulder County for more than 10 years while two of the three respondents who did not report Boulder County as having an influence lived in the county for less than five years. This finding is particularly interesting when considering the influence place has on one’s identity over time. These survey findings from CUSD programs suggest that hands-on exploration in a supportive learning environment can positively influence learners’ experience with science and that support from parents and caregivers plays an important role in children’s lived experience as well. The latter finding is consistent with other findings in the significant life
experience literature that has repeatedly found that parents, family members, and caregivers play a significant role in the impact of children’s lived experience and learning opportunities.

**Survey Responses to Environmental Identity Scale**

The environmental identity scale (EID) as developed by Clayton (2003) is a measurement of one’s current attitude, beliefs and action related to the natural environment. For the purposes of this survey, the scale is not directly linked to program experience, but is an overall reflection of environmental identity in general. Certainly, the program may have played a role in the formation of this identity, but this scale can also be considered a reflection of collective life experience. When applicable, I explored this scale in greater detail with the follow-up interview participants to better understand their responses and reaction to the questions.

In order to maintain consistency throughout the entire survey, I kept the EID scale options at the same 5-point level I had applied to the other survey questions. The participants were asked to rate themselves based on the degree to which they identified with each statement: “completely true of me;” “true of me;” “neither true nor untrue;” “not true of me;” or “not at all true of me.” Participants’ responses were then scaled accordingly where a response of “completely true of me” was valued at five points to “not at all true of me” was valued at one point. The possible range of scores for the scale was 11 to 55. It is important to note here that all of the survey statements were constructed in a positive direction; in other words, responding “completely true of me” or “true of me” would place the participant on the higher end of the scale for each statement.
In general, respondents scored moderately high on the EID scale, with over 50% of respondents identifying that the statements were either “completely true of me” or “true of me.” The average score for the scale was 44 (SD=7.67). Women tended to score higher than men with an average score of 46 compared to men’s score of 40.75. However, the ratio of female to male respondents was nearly double: 13 to 8. Table 21 reflects the summary of responses to the scale.

Table 21: CUSD responses to Environmental Identity Scale (n=21)

<table>
<thead>
<tr>
<th>“Please indicate the extent to which each of the following statements describes you…”</th>
<th>“completely true of me” or “true of me”</th>
<th>“neither true nor untrue” or “not true of me” or “not at all true of me”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spend time in natural settings</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>Think of self as part of nature</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>Would devote time/money to the environment</td>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>Nature relieves stress</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>A lot in common with other species</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>Living a sustainable lifestyle part of moral code</td>
<td>17</td>
<td>4</td>
</tr>
<tr>
<td>Importance of children learning about natural world</td>
<td>21</td>
<td>0</td>
</tr>
<tr>
<td>Prefer natural view over house/room size</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>Need access to nature</td>
<td>19</td>
<td>2</td>
</tr>
<tr>
<td>Nature most beautiful work of art seen</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Receive spiritual sustenance from nature</td>
<td>11</td>
<td>10</td>
</tr>
</tbody>
</table>

A particularly interesting finding was the response to children’s time in nature. Regardless of class type participation, all survey participants believed that “learning about the natural world
should be an important part of every child’s upbringing.” This finding hints at the intuitiveness and inherent value people place on establishing and maintaining a positive relationship with the natural world.

With regard to spending time in nature, 19 out of 21 survey participants responded affirmatively to the question: “I would feel that an important part of my life was missing if I was not able to get out and enjoy nature from time to time.” The remaining two responded with “neither true nor untrue.” Similarly, 17 of the 21 responded affirmatively to the importance of living a sustainable lifestyle. The remaining four responded with “neither true nor untrue.” I found participants’ responses to these particular questions intriguing as these responses suggest that, above all else, participants’ possess a basic connection to the natural world and understanding of their role in protecting it – a key component of environmental stewardship.
CHAPTER VI
DISCUSSION & IMPLICATIONS

Introduction
In the following chapter, I will summarize and discuss the findings explored in the context of social practice theory and significant life experience (SLE) literature and how these findings helped address this study's guiding research questions. I will then provide some possible implications of this study for the fields of SLE research, social practice theory and environmental identity, and the application of these findings for place-based environmental education and science-inquiry programs. Finally, I will recognize the limitations of this study and suggest how they could be addressed in future research.

Summary of Findings
This study began as a way to explore the development and formation of environmental identity and stewardship behaviors on program participants within the context of nonformal place-based environmental and science-inquiry education programs. While there is much research exploring best practices within environmental education, including the short-term outcomes of such programs, much less is known about the lifelong influence of these programs on participants’ environmental stewardship identity. If the mission of environmental education programs includes a component of generating or inspiring future environmental stewards, then it is important to know to what extent and in what ways these programs are successful at doing so.

I also wanted to explore whether environmental stewardship was most influenced by the explicit element of place-based environmental education or if other nonformal learning
environments might also contribute to this increased awareness and personal action. To do this, I examined three nonformal education programs within Boulder County, two of which are place-based environmental education programs and the other a science-inquiry program. In my exploration of participants’ program experience, I applied the following question: When participants recall program experiences, what experiences remain salient to them and how do they understand those experiences to have shaped them over time, including but not limited to their environmental identity?

I used Holland’s (2003) social practice theory’s approach to identity formation to help frame the analysis of findings, while also using past SLE research findings to elaborate on findings related to environmental stewardship. To collect participants’ experience, I employed two methods of data collection: open-ended narrative interviews and a close-ended survey. Ultimately, I was able to conduct 21 narrative interviews with past participants of the three programs: six Thorne participants; seven Wild Bear participants; and eight University of Colorado Science Discovery (CUSD) participants. However, the survey results were limited and yielded a response rate just fewer than four percent. Therefore, the narrative interviews became the bulk of my data analysis and the platform on which the findings and following discussion now stand.

What emerged from the interviews of all program participants was the saliency of hands-on learning in a supportive learning environment. While the three programs were varied in subject area, this theme was consistent and evident in each. Participants of each program frequently recalled how their program encouraged creativity and fostered a sense of wonder in the world around them. Participants from each program also remarked on the supportive
learning environment of each program, fostered by program instructors and staff. What did differ between the programs was participants’ engagement with the natural world. Participants of Thorne, Wild Bear and CUSD's wilderness camp all reflected on the program's influence on their perception, appreciation and awareness of the natural world. Only participants in these programs credited the program specifically for contributing to their environmental stewardship identity.

With regard to my secondary research questions on stewardship, program type, career choice, and place, participants’ narratives helped shed light on how these questions could be answered. Nature-based programs contributed to a sense of environmental stewardship identity among participants, which in turn helped to address the following question on program type. These findings suggest that there is a difference between nature-based and science-inquiry programs with regard to environmental identity formation.

Participants’ who only attended classroom-based science-inquiry programs did not credit their current sense of environmental stewardship to program participation. However, the majority of participants in nature-based programs did attribute their current environmental stewardship, at least in part, to their program experience. In terms of influence on career choice, only a few participants from all three programs did credit their experience for inspiring their current academic or career path. Place did emerge as a contributor to both the saliency of program experience and environmental stewardship identity. Participants of nature-based programs reflected on their experience in natural local places, while all participants, regardless of program, reflected on the role of Boulder County in terms of environmental awareness and stewardship.
One of the biggest hurdles much of SLE research has faced in the past has been finding a theoretical framework that supports both its approach to exploring experience and an explanation of the subsequent findings. Based on the findings from this study, much of what social practice theory suggests regarding identity formation over time helps to explain the processes and experiences often reported by SLE research participants. As I demonstrated in the findings chapter, social practice theory effectively mapped and predicted what SLE research has identified in past research. When compared side by side, I found congruence between the predictions social practice theory makes towards identity formation and SLE research findings. The application of social practice theory’s approach to identity alongside previous findings of SLE research provided a functional theoretical framework for this study and, arguably, for future studies as well.

In the following section, I will discuss how the findings reflect Holland’s social practice theory’s understanding of identity formation. I will do this by revisiting my primary research question and secondary research questions, in addition to social practice theory’s identity framework. I will also make note of the ways in which social practice theory has helped illuminate past SLE research findings. Before going further into the discussion, however, I would first like to provide my general reflections on the findings and outcomes of this study.

What has emerged most significantly out of each person’s story and experience with their respective program is that hands-on learning opportunities are essential in creating influential experiences for students at all ages. Repeated experience was also a critical factor in saliency and thickening of identity over time, as only one person who shared her story recalled a one-time experience with her particular program. The influence of repeated experience is
reinforced by similar findings within the literatures on SLE, place-based education (PBE), and social practice theory.

Most of the interview participants were in their early- to mid-20s (17 out of 21) and I was truly overwhelmed and impressed by their passion, enthusiasm and overall eloquence as they spoke about their recalled experience, the influence they attributed to it, and their hopes and aspirations for the future. Their memories were vivid and exciting and at times, elicited real emotion. It quickly became evident that each of the respective programs has left quite an impression on these young people over their life course. While almost all of them expressed a strong commitment to environmental stewardship, in their day-to-day lifestyle, professionally, or both, what is clear is the influence such programs can and do have on participants who attend them over time. It is not that every participant is now in a STEM-related field or a card-carrying member of Green Peace, but that the program shaped and contributed to their current identity and understanding of the world. Any educational program should be so lucky.

With Thorne, Wild Bear, and the CUSD wilderness camp, it seemed to matter less what was being taught than how it was taught. While several participants did share their recollections of specific activities, what remained salient to them was the overall message and experience of the program. In other words, it was how the learning environment was staged by program instructors and staff that resonated and remained with participants, not that they learned about conservation practices or bird migration. This concept also emerged within the CUSD wilderness camp participants in particular. The overall awareness these participants gained of being in the natural world has had a lasting influence on their lives.
I see this approach to learning environments as being an important highlight of the findings of this particular study and its ability to help other similar programs in their efforts to teach children and people about the natural world around them. Focusing less on the negatives of human impact on the natural world, worrying less about content than the context of experience, and focusing more on experiencing the natural world is not a new concept, particularly within place-based environmental education literature. I do not mean to suggest that content does not matter, but when it is integrated into the local place, given context and relevancy, the potential for learning and knowledge construction greatly increases.

Additionally, with Thorne, Wild Bear, and the CUSD wilderness camp, the sense of community and family ran through each person’s story as an integral piece to their experience and why that particular program resonated with them. As social beings, we crave and desire connection to one another and to other species. Any space that safely, gently and humbly offers that connection will likely become one that we revisit often, mentally, spiritually, and/or physically.

**Relationship to Theoretical Framework**

**Goodness of Fit**

I found Holland’s (2003) articulation of social practice theory’s approach to identity formation, along with Clayton’s (2012) summary of environmental identity formation, and the understanding of significant life experiences to fit quite nicely within the context of this study. Each understanding reinforced the other, with social practice theory helping to illuminate much of what past SLE research findings suggest. I also found narrative analysis to be a sound approach to understanding experience, as it too fit with not only the context
of the study, but with the theoretical framework as well. Clayton (2012, p165) elaborates on the ability to understand identity formation through narrative:

> When we start to think about what it is that selects and interprets information and constructs a narrative about experience, in ways that result in different narratives for different individuals, we open the door for discussions of identity.

Aside from its fit for this study, I found the narrative process to be an enjoyable process as a researcher; it has proven to be a process that has both challenged and strengthened me as a researcher and an individual. Although I was unable to select participants based on a variety of experiences and the gender ratio was more than 2:1 females to males (15 females; 6 males), I do understand the experiences to have varied enough between and within programs to provide valuable insights on the influence of these programs.

**Sense of Community, Sense of Belonging**

Particularly salient for many participants was the sense of community and sense of belonging they felt through their program participation. For young children and youth, feeling valued and validated by others, particularly those outside of their family, can play a role in their own understanding of who they are and the value they place on their role in that community. There is value in having a family outside of one’s immediate family – an extended community of support – wherein a person can feel like a chosen member of that group who not only receives support, but who also feels as though he or she has something to offer as well. When thinking of how an individual identifies with a group and the various attributes ascribed to it by the people within that group, it seems that a sense of belonging, ownership and investment in that group is essential to accepting it as a part of one’s identity.
Mementos

Another salient and interesting element of many participants’ narratives included their mention of a keepsake or memento from their program experience. A keepsake or physical reminder of the experience was a repeated theme among many of the participants regardless of program. For some, it included natural treasures collected during their program such as rocks, bird feathers, or personal sketches. For others, it was a culminating gift given to them by the program instructor at the end of their trip or program as a reminder of where they had been, what or whom they had seen, and what they had done.

The Wild Bear participants recalled the program frequently including some art aspect in every activity, such as bug collections and nature drawings. I found this to be an interesting component of a nature-based program and view this creative aspect as a very smart way to tap into children’s desire to express themselves through drawing, art, and manipulation of materials. Children do not often have the words to express their thoughts or feelings, but art can allow that expression to shine through. Several former Wild Bear participants made mention of the fact that they still possess these creations.

In reflecting on how identity thickens over time, I wonder if these mementos or keepsakes helped participants hold on to that experience, shaping its overall significance and influence on their life. It is not unusual for people to take trinkets with them from places they have been as reminders of what they did, who they met, or what they experienced. On each encounter with these mementos, they can be transported back in time and place to that particular experience, serving as a reminder of who they were then, how they have changed since, and how that experience is forever a part of their personal history.
Care for Animals

Common among many participants’ narratives, regardless of program, was the frequent interaction with animals. Children possess a natural affinity for animals from a very early age. Research suggests that they often learn empathy from interaction with animals as they recognize similarities in their own feelings and emotions (Clayton & Myers, 2009; Faber Taylor & Kuo, 2006; Myers, 2007). Myers (2007, p55) describes how children come to understand themselves through relationships with animals stating that “a child may incorporate the animal’s well-being in his or her own sense of self.” The hands-on experience of interacting with animals, particularly animals that are unusual, can potentially have a lasting influence for how these grown-up children will later interact with, perceive and value other species and their natural habitat. This increased awareness can in turn lead to a desire to protect the natural environment through one’s actions.

This act of caring for animals is reinforced by flow of practice within Holland’s understanding of social practice theory and when reinforced over time by mentors, can lead to a sense of empowerment and competency for these young caregivers. As such, they may begin to view themselves as active members of a community of caregivers, placing themselves within that collective group identity.

Learning Environments

Another element of saliency among many participants’ shared stories was their reflection on how their program differed from other learning environments, often expressed as formal education. I began to wonder if the saliency, at least in part, had to do with this marked difference in learning experience. If learning is the result of absorbing information just
different enough from and building off of what we previously knew, then could this difference or contrast in learning environments be a significant contributing factor to the long-term influence of these programs? That is, these programs were just different enough from other childhood experiences to stand out as significant and meaningful in these participants’ lives.

I understand many participants’ experiences to have connected with the types of learners they are, providing them support, knowledge and respect when they desired it the most. This type of supportive and engaging learning environment can have profound impacts on participants’ willingness to learn while helping to reinforce for the learner that they too have something to offer.

**Flow of Practice**

A salient theme among all participants was the element of practice and engaged participation. James, Bixler and Vadala (2010) propose a model that illustrates how a child who experiences the outdoors and nature early on might progress and develop into an adult who acts on behalf of the natural world. An important component of this progression is the development of a sense of competence. That is, children and youth begin to practice important skills related to a particular field. When they excel at these skills, practice them over time, add new skills and are reinforced by key members of these fields, they begin to envision themselves as a part of that field. This also coincides with the formation of identity as it relates to action. Within the flow of practice, saliency of practice might be a key contributor to the formation or thickening of one’s identity.
Within the realm of SLE research, James, Bixler and Vadala’s (2010) developmental model helps explain how identities develop over time in natural settings, particularly related to professionals within the natural history or ecological services realm. Additionally, social practice theory helped to elaborate on their model and the ways in which this model explains identity formation over time. James, Bixler and Vadala employed an environmental socialization approach to understand the variety of influences at play within experiences and over time. While not all of the narratives fit within this developmental model they propose, there certainly was some consistency. For example, not all experiences occurred as sequentially as their model suggests, but often occurred simultaneously, out of order, or were passed over completely. What was consistent was the formation of skills that developed and advanced with each repeated experience and the role of mentors in guiding participants’ skills and positively reinforcing participants’ abilities. James, Bixler and Vadala (2010, p250) reinforce this finding in their discussion as well: “Clearly, a person does not wake up one morning and become an environmentalist or a birder; environmental socialization events are complementary and mutually reinforcing.”

Identity Formation in Adolescence

For many of the CUSD wilderness camp participants, their experience did not begin until early adolescence and continued throughout their teen years. Several mentioned that they had not had many childhood nature experiences prior to their camp participation or that their families were not particularly eco-aware. Maybe it is that teen years are closer in memory to many of these former students than their early childhood and so they recall the experience in greater detail and with more emotion. But I think something happens to
identity when youth are allowed the opportunity to explore, learn and socialize through nature.

Chawla (2009, p10) further elaborates on the effects of child and youth socialization in the natural world explaining that from a developmental perspective “children develop through direct encounters with the physical world as well as social and cultural learning.” In reference to the Eccles and Wigfield expectancy-value model that depicts how children might develop goals for action through repeated social interactions and experience, Chawla goes on to explain that “the physical world is the larger context of the model that forms not only its container but also the medium through which social relations are enacted” (p10). For the CUSD wilderness camp participants, the natural physical world was an integral part of their socialization, serving both as the setting of experience and inspiration for action.

Much of the literature on children and nature places a heavy emphasis on early and middle childhood experiences, often overlooking the adolescent years. While early childhood connection with nature is indeed important, so too is adolescent connection to the natural world. Identities are being significantly molded, reflected and refigured during this developmental period of any person’s life. When one has the ability to see that identity in perspective to the bigger picture, it can create an opportunity for peace in a very tumultuous time, internally and socially. Chawla and Derr (2012) and James, Bixler and Vadala (2010) argue that this time in development can be particularly formative and adolescent experiences in nature can have a profound and life-long influence on a person. Chawla and Derr (2012, p535) elaborate on this further:

If people fail to have outdoor experiences in nature in early or middle childhood, all is not lost. Intense experiences of nature, inspiring mentors, supportive friends, and
engaging organizations in adolescence not only reinforce early experiences but also appear to be able to compensate for missed experiences of early free play in nature, for the purposes of action.

Wilderness camp participants and those that returned as teaching assistants in this study make an argument for engaging youth especially during this time. Adolescents are engaged in a particularly vulnerable stage of development, as they are beginning to figure out who they are and what and/or who they identify with, modeling these identities to conduct their own “goodness of fit” measure.

Chawla and Derr (2012) provide a summary of several studies that have explored this age group within the context of wilderness expedition programs, either through a one time or repeated experience with the program. However, less is known about other place-based environmental education programs that are less immersive, such as Thorne or Wild Bear, but have the potential to offer an experience that is repeated year after year, over several weeks or months, and are located within participants’ communities. Future research studies should look to explore and extend our current understanding for how adolescents in particular connect with the natural world and other nonformal educational settings in order to better understand the ways in which these settings tap into this developmental stage, potentially making a lasting impression.

**Casting Identity**

Holland (2003) and colleagues’ (Kempton & Holland, 2003; Kitchell et al., 2000) articulation of social practice theory was able to illuminate why participants were motivated to act in certain ways within their recalled experience and within the interview setting. I aimed to maintain a sense of reflexivity within the interview setting and when revisiting the interviews
for transcription and analysis. When participants revisited their memory, at times it was as if they were back in a past setting, forgetting about my presence or the interview. However, when participants began to self-identify themselves or speak of their attitudes, beliefs, or actions, it was not uncommon for me to sense that they were trying to communicate a certain identity to me. This is not unnatural in any given social setting, particularly with first-time encounters. Clayton (2012, p167) articulates this phenomenon well:

> Relatedly, identities can both prescribe and motivate action. Role-based identities describe the social expectations for associated behavior. Across multiple different roles, we are motivated to behave in ways that are socially valued in order to maintain identities that present us positively to others as well as to ourselves. Even more important, perhaps, is the motivation to behave in ways that are consistent with our desired self-image.

Being sensitive to this, I made every effort within the interview setting for participants to feel as comfortable, and the conversation as natural, as possible. Often, as the conversation progressed, their body language and the way they spoke became more relaxed. I understood this transformation to indicate an increased level of trust and comfort with me. I imagine that had I conducted multiple interviews with each participant, this relationship would have continued to evolve, extending the illumination of participants’ identity and how they understand their program experience to have influenced their lives.

**Relationship to Secondary Research Questions**

The four secondary research questions of this study were intended to provide a structure and guided road map for exploring findings within the context of social practice theory and SLE research. Below I explore each of these questions and how they were addressed through participants’ stories.
Environmental Identity & Stewardship Behaviors

As summarized above, I began this study as a way to explore the development and formation of environmental identity and stewardship behaviors within the context of nonformal environmental and science-inquiry programs. As outlined by one of my secondary research questions, I was interested in how these program experiences influenced participants, if at all: Do participants believe these experiences influenced their environmental identity and stewardship behaviors? If so, how?

For the nature-based programs, including the CUSD wilderness camp, participants’ reflection on program experience suggests that these programs did influence their environmental identity. The time these participants spent in nature within these programs developed in them a sense of wonder and appreciation for the natural world. Through repeated experience, participants’ narratives indicate that this time in nature contributed to a thickening of identity that has motivated care, concern and action on behalf of the natural world. Participants expressed this in a variety of ways from projecting an overall awareness of their place and role in the natural world to actions such as recycling, composting, reducing vehicle miles traveled, general consumer-based choices, and supporting environmental causes, politically, socially or financially. What is less clear is how the other CUSD program classes might have also influenced this identity by making participants more engaged with and curious about their world, in turn laying a foundation for participants’ understanding of the “big picture.”

Where participants struggled with claiming an environmental identity, this identity claim appeared to be closely related to the context of place. One might imagine that growing up in
such an environmentally aware place as Boulder, Nederland and the greater Boulder County could put an enormous amount of pressure on a child or youth to take up that identity or risk being alienated from that community sphere. Kempton and Holland (2003, p318) explore the ways in which sociocultural norms impact values, beliefs and behaviors and, as they argue, identity as well:

Social environmental identities locate a person as an environmentalist, or a particular type of environmentalist, in a context of persons, groups, and struggles. One’s social environmental identity also contrasts with that of others – others who have different identities, take different roles within or opposed to the movement, and carry out different actions.

Several participants from all three programs professed a reverence or high regard towards identifying as an environmental steward. On the other hand, a few seemed to distance themselves from such an identity, although they did identify as people who love being in the outdoors and in nature. I found this theme particularly interesting as it relates to the collective group identity of being an environmental steward and I think these participants’ reflections mirror much of how the general public feels about being a member of this particular group. In these participants’ narratives, there seemed to exist a level of defensiveness or sense of not being good enough. However, when looking at each of their narratives as a whole and how they view nature and the natural world, I would interpret each of these people as being caring and thoughtful nature stewards.

I have struggled to make sense of this range of identities with regard to environmentalism; however, I do believe it is a reflection of our cultural norms and expectations. For those who carry a high regard for stewardship, it is as if society has placed environmentally friendly behaviors on a pedestal. If environmentalism or stewardship behavior is viewed as unattainable by much of our Western culture due to the commonly associated “sacrifices” of
environmental actions, then is it possible that the disassociation with the movement, with those labeled environmental behaviors, is due to this idea that it is out of one's reach? Instead of joining the movement or taking on some actions, people abandon it all together. As we have seen with the other aspects of participants’ narratives regarding a sense of belonging, it is paramount that individuals feel connected and valued within a group in order to take that on as a part of their identity. I think this theme touches on an important consideration for the environmental movement as a whole and how individuals come to identify or not, take action or not, on behalf of the environment.

Holland (2003) elaborates on the U.S. environmental movement in general through her findings on hunters and environmentalists. While both parties viewed themselves as caretakers of a shared natural open space, each party viewed the other’s approach as problematic. With regard to localized environmental conflicts around the country, she explains that “the conflicts have led to experiences of social distance and disrespect from mainstream environmentalists leading to a virtual arrest of the movement among segments of the population” (Holland 2003, p46).

Holland (2003), Kitchell et al. (2000), and Holland and Lave (2009) discuss the complexities of multiple identities that help shed some light on this study’s findings. Kitchell et al. (2000, p2) explain “that concepts of self as an actor and actions taken vary according to the perceived world.” Holland and Lave (2009, p9) apply social practice theory’s explanation of this phenomenon as “history in person,” which is often a reflection of an individual’s experience in both time and place. They explain that “identity development can often be
characterized as forming around dialogues over difference between self and internalized version(s) of ‘the other’” (p9).

For study participants like Amanda and Anna, they were critical of the places, Nederland and Boulder, respectively, and sociocultural practices where they grew up. Both of them struggled with claiming an environmental identity. While I do not want to overextend my interpretation of their narratives, I do think this struggle was a reflection of their personal histories in place and their identification with local people who might also identify as environmental stewards.

Holland (2003) discusses the use of the term “environmentalist” and what that label means for different people with differing identities. She also discusses that people’s paths to action may be quite different, but that many people who maintain an environmental identity are engaged in sustained environmental practice and are thus working towards the same end. What people call themselves matters much less than the actions they choose to take. James, Bixler and Vadala (2010, p251) further elaborate on this path to action:

> Experiences with nature start out as fun, engaging, challenging, awe-inspiring and evolve into respect and care as the developing person’s recreation-related social worlds intersect with social worlds constructed around environmental concerns.

The findings related to stewardship identity are not unique to this study. Tesch and Kempton (2004) conducted a study examining different environmentalist terms and actions, seeking to understand how different environmental groups identified themselves and others. Interviews with a variety of environmental group members revealed the inherent complexity of labeled identities. Labels are socially-created, culturally-bound terms that conjure up a general idea or understanding; however, individuals may possess a more specific or detailed
understanding of that general idea that either resonates with them, or not, leading them to include, or not, such a label as a part of their self-identity. I was sensitive to the use of terms associated with environmentalism and I intentionally chose “environmental steward” for this study to embody a gentler, more approachable label for what I was trying to understand.

**Comparison of Nature-Based & Science-Inquiry Programs**

Another secondary question for this study reflected an attempt to understand how different programs might affect participants’ overall experience. In analyzing the interview transcripts, I looked for ways these programs seemed to differ: Is there a difference between nature-based and science-inquiry programs regarding formation of an environmental stewardship identity?

With regard to hands-on learning, mentors and promoting a sense of wonder, the programs did not differ significantly. Participants elaborated on how these different themes played into their overall experience of the program and remained part of their recollection and the value they placed on that experience. However, when these components occurred in a natural outdoor setting, participants reflected on how that experience developed in them an appreciation for the natural world.

Research within the field of environmental psychology is working to explain just what it is about nature that resonates with people. Nabhan & Trimble (1994, p23) elaborate on how nature, in particular, can make an experience more profound as it is a non-judging place that welcomes all who seek it:

> The natural world does not judge. It exists. One route to self-esteem, particularly for shy or undervalued children, lies in the out-of-doors. If, as psychologist Jean
Baker Miller asserts, the model of seeking identity by “developing all of one’s self in increasingly complex ways, in increasingly complex relationships,” is desirable, nature is a wonderful place to seek. The sun, the wind, the frogs, and the trees can reassure and strengthen and energize.

While all of the participants identified with this appreciation of the natural world in varying degrees, it was not always a direct reflection of program experience. Only when participants recalled nature-based program experiences did they attribute their appreciation and environmental behaviors, at least in part, to the program. On the surface, this finding may appear to be obvious and common sense – if programs were based in nature, participants would be more likely to develop a sense of stewardship. I was open, however, to the idea that hands-on inquiry, creative and engaging learning environments, and positive mentors might lead to greater awareness of the world and thus inspire a desire to see the connection between one’s actions and the influence those actions have on the social and natural community.

When CUSD classroom-based participants spoke about an increased awareness and curiosity in the world, it was directly related to the area they studied in class. In other words, that experience helped participants become more aware of how they could be successful in the world through creative approaches to problem-solving that involved engineering, chemistry and design. The findings from this study suggest that direct, hands-on experience in the natural world is needed to encourage environmental stewardship. The ways this experience is expressed may not matter, but the natural experience most certainly does.
Career Choice

In an attempt to understand the variety of ways identity can be expressed, I was curious to see if participants’ career choices had been influenced by their program participation. I explored this in each interview by asking the following question: If career choice can be a reflection of identity in action, how were participants’ career choices shaped by the influence of these programs, if at all?

When participants explained what their current academic or career paths entailed, I asked them whether or not their program experience had shaped that decision, especially when it seemed directly related to their program. There were a few instances when participants offered this information without my additional probing, crediting their repeated program experience for their current academic or career path; more than half of the participants credited their program for influencing their academic and career choice. While this number can certainly indicate the degree of program influence, I began to think about our country’s current economic situation and job(less) reports. It occurred to me that having a true choice in one’s career path is a privileged notion and that one’s current job or career may or may not be an adequate reflection of one’s identity, but more of a reflection of our economic times and the desire to meet personal financial needs. Many of these participants were college- or just post-college age, some struggling to find a job or simply happy to have one. As such, I inquired about participant’s jobs with caution, hesitating to read too much into what participants shared.

Of the 21 participants, three had jobs related directly to environmental and outdoor education, which they credited directly to their program experience. While all of them
acknowledged the less than robust salaries they received, they each expressed how fulfilled and satisfied they were in the positions they held. They all believed deeply in what they were doing, educating others about the natural world, and explained that they could not imagine themselves doing anything else. For these three participants, I understand their jobs to be a direct reflection of their identity as all three self-identified as environmentalists.

Additionally, all of the CUSD wilderness camp participants have sought jobs that look to help others, either in their understanding of the natural world or succeeding in society. Four participants are currently employed as educators and one in crisis prevention. They all explained how they reflect on and bring what they learned through their wilderness camp experience to their work world whenever they can. In their discussion of wilderness expedition programs, Chawla and Derr (2012) discuss the transferability of skills from this “wild” setting back to everyday life. According to various study findings, many wilderness programs have struggled to prepare participants in applying those experiences and what they learned from them in the real world. There is a risk “that youth connect to the essential nature of ‘wilderness’ without necessarily gaining transferable skills leads to an important question: Will youth come to see nature as a medium to be used for personal growth and benefit, or will it also be respected and cared for?” (Chawla & Derr, 2012, p548).

Something about the CUSD wilderness camp, the people, the place, and the wolves at Mission: Wolf, resonated with all six wilderness camp participants on a deeply rooted level. This experience not only empowered them, but quite possibly reminded them of the people they are supposed to, or hope to, become; on realizing this, these participants have continued on a path that would resonate with and reinforce this realization. It is visible that
their experience was not just tangible, mentally or physically, but also deeply emotional. I believe that emotional connection triggers events or experiences in life to become more fully a part of who we are. Although cognitive change and physical experience are certainly a part of these experiences, it seems to extend beyond mere learning. Or maybe that is when learning experiences actually become a part of our identity – when it extends beyond the cognition of what one formerly knew and enters a realm deeper, more meaningful, as if an inner reflection of who we can or are supposed to become? Based on the narratives shared from the wilderness camp, it is clear that this program and its leaders succeeded in bridging “this disconnect between the wilderness experience and the ability to act on behalf of the environment once at home” (Chawla & Derr, 2012, p548).

Six other participants, two from CUSD, two from Wild Bear, and two from Thorne, had jobs or were in academic programs that directly reflected their program experience. They credited their current positions to their program experience and all were in either STEM fields, education, or environmental and sustainability services. I understand this finding to reflect the ways in which programs can encourage the innate interests of young learners and can provide for them a space to explore these interests and understand how these interests can play a role in their future. There is great value in being able to try on identities in spaces that are encouraging, compassionate, and non-judging. I view these opportunities as a reflection of what participants said about their respective programs differing from other learning environments. Students were able to try, to fail, to explore, and to engage without reprimand. While these programs may not inspire all children to pursue science or environmental education as a career, it seems as though there is potential for these programs to encourage the creativity and sense of wonder in a child. That positive space might
encourage that child to pursue an academic or career path later on that they might not have otherwise chosen.

**Sense of Place**

Consistent with social practice theory’s consideration of place, the context of place can and often does play a significant role in how identities are shaped, perceived and taken up (Holland, 2003; Kempton & Holland, 2003). In proposing this study, I wanted to pay attention to the role of place in identity formation, as it has emerged as a dominant theme in SLE research and social practice theory. I used the following question to help me explore this within the interviews: Does place play a role in the saliency of these experiences and their influence on identity formation over time?

In asking this question, I wanted to consider how place, outside of program experience, might play a role in identity formation. As my interviews with participants from each organization grew in number, I came to realize that place also has an influence on the program organizations and the missions of each, as these organizations are directed and staffed by people situated in that same local place. I had aimed to understand the role of place outside of the program context, but it became clear that teasing the two apart would be difficult. Some participants did not mention the role of place, living in Boulder County, as a part of their program experience. However, several mentioned place-specific memories related to their program experience and occasionally mentioned that their program’s mission was reinforced through local sociocultural values.
I found that even if participants did not describe themselves as environmental stewards, they were nevertheless ready to consider themselves nature lovers or outdoor enthusiasts. Where program experience could not explain this perspective, place did. All interview participants spent the majority of their childhood in Boulder County and credited their current environmental attitudes to the experience of growing up in such an environmentally aware place. Many also reflected on the ways in which Boulder County and their respective programs reinforced each other’s message. Clayton (2012, p172) explains the role of place in shaping environmental identity: “a strong place-based identity can motivate action to protect a particular location, and a strong environmental identity can motivate action to protect the environment.” I understood many of the participants’ stories to reflect both a desire to care for a particular natural place and for the environment in general.

What was most striking about the role of place in program experience is that it was exclusively limited to participants who had participated in outdoor programs. For these participants, the outdoor natural setting played a significant role not only in their sense of place and overall experience, but also their development of an environmental identity. Participants of CUSD’s classroom based programs did not reflect on place with regard to their program experience.

One of the most frequently cited SLE influences for adult environmental attitudes and behaviors is time spent in natural areas. In congruence with previous SLE findings, Thorne, Wild Bear and CUSD wilderness camp participants recalled memories that included the experience of outdoor and natural areas. They also credited this learning environment as a significant influence on their current attitudes, beliefs and actions towards the natural environment.
This finding strongly echoes that of other studies that have explored the influence of direct, hands-on experience of being in the natural world. Nature can provide for us a point of reference: geographically, socially, personally. CUSD wilderness camp participants often reflected on the opportunity to just be in nature, offered the chance to pause and step back from what they were experiencing in that moment, to reflect on how they were feeling, what their thoughts were, or where, in that moment, they were situated, physically, mentally, emotionally, spiritually.

Experience of natural areas includes an aspect of hands-on and sensory-based learning by engaging with the physical surroundings through sight, sound, smell, touch, and occasionally, taste. Engaging the bodily senses in such a way can also engage the more abstract formations of sense of wonder and sense of place. These experiences suggests that our connection to place, our sense of belonging within a place, is profoundly influenced by the way in which that place stimulates our senses and enhances our understanding of place experience.

Nabhan and Trimble (1994, p22-23) offer insight into how nature not only engages with us, but also engages us with ourselves, teaching us a little more about who we are and where we belong within this great big world:

Nowhere, it seems, do human concerns matter less. And yet, nowhere else is the simple fact of our existence so exhilaratingly clear. Nowhere do so few trivializing and demeaning assaults on egos exist. Nowhere do humans matter more […] the Earth enfolds people in storm or warm sun, in the glory of light filtering through the canopy of deep woods, or in the eddying flows of rivers – without regard for whether we say the right words, wear the right cloths, or believe the right dogma. We are simply human beings setting out into the sanctuary of fields, woods, desert. We have to pay attention, certainly, or we will find ourselves in danger; nonetheless, the land releases us from competition. Such acceptance restores us for the social fight.
Over repeated experiences, these places became a significant part of each participant’s recalled experience and when returning to these places physically or mentally, they revisited those experiences and the way that particular place played into those moments of wonder, exploration and play.

These direct experiences with the natural world reinforce that while experiences within the built environment can be influential, it cannot serve as a replacement for the direct, personal, and intimate interaction with the nature. There is something unique, profound and un-replicable that happens when individuals engage hands-on with nature. In our virtual age, environmental psychologists, place-based educators, and outdoor play advocates have lamented over whether or not a virtual experience of nature can also foster a sense of appreciation and care, serving as a motivator for action. While these virtual encounters and images may reinforce experiences in the natural world, this study suggests it is not a replacement for real world exploration and connection.

**Study Implications**

This study’s findings contribute to the limited understanding of the life long influence of place-based environmental and science-inquiry nonformal education programs. Based on the findings from this study, there are specific components of these programs that proved most influential and lasting: hands-on learning, compassionate and gentle mentors, and creative and engaging learning environments. This study suggests that learning environments can be particularly successful and make a lasting impression when such spaces create an opportunity for repeated experience, explorative play, healthy socialization, and guided, compassionate inquiry.
Theoretical Framework

Holland’s (2003) and Holland and colleagues (1998; 2000; 2003; 2009) articulation of social practice theory served as the theoretical framework for this study. What initially attracted me to Holland’s work was her application of social practice theory to the formation of environmental identity. A key component of social practice theory’s understanding of identity is the element of action and active participation (Holland, 2003; Holland & Lave, 2009; Kempton & Holland, 2003). Exploring the ways environmental stewardship forms through different learning environments required that I pay attention to identity in action.

This study’s application of social practice theory within place-based environmental and science-inquiry nonformal education helps extend social practice theory’s understanding of identity into a new area of research. While social practice theory has been applied by Holland and others to understand environmental identity, it has had limited presence within the field of environmental education research. Through this study, social practice theory has also demonstrated how its identity framework can help explain SLE findings and therefore, can provide a useful theoretical framework for future studies.

The exploration of past experience through narrative helped me understand the variety of ways these learning environments influenced participants and the ways in which participants chose to participate, interpret and understand that influence. Participants’ narratives revealed what Holland’s social practice theory would predict: identities are complicated, situated in place and history, and require action that thickens these identities over time. While social practice theory has been applied within educational research and Holland’s research has explored environmental identities among designated environmental groups, it
has not previously been applied to the field of place-based environmental education or within the context of significant life experience research. This study extended social practice theory into these particular fields demonstrating how social practice theory, particularly Holland’s interpretation, can help explain, elaborate and predict what these research fields have explored in the past and will possibly explore in the future.

In a similar vein, Chawla (2009) explored past research on the formation of environmental action and care through a three-part lens of socialization using Eccles and Wigfield’s expectancy-value model, Hoffman’s theory of empathic morality, and Bandura’s perceived efficacy. Much of what these three models explore embraces the concepts behind Holland’s application of social practice theory to environmental identity formation. Chawla’s synthesis of these three perspectives weaves together sociocultural influences, the physical world, and action.

For this study, social practice theory provided a tighter explanation for what Chawla (2009) presents by applying one theory and its understanding of identity formation. What was unique about this study was its exploration of nonformal environmental and science education programs, its application of social practice theory to understand the influences of these programs over time, and its exploration of participants not exclusive to environmental groups or vocations. This study extends Holland’s expression of social practice theory into the realm of place-based environmental and science education providing a scaffolding for exploring participant experience and identity formation over time. Additionally, I believe this study helped reveal and reinforce the fit of social practice theory to exploring environmental identity and identity formation in general. Social practice theory can both
explain identity formation over time and predict how certain interactions might lend a hand to the thickening of identity. This application can be useful for both retrospective studies, such as this one, and ethnographic field studies looking to explore how environmental identity takes shape in real time.

**Nature-based vs. Science-inquiry Programs**

While all of the programs supported hands-on learning and all participants reflected on the significance of hands-on learning, there was a marked difference between the place-based environmental education and the science-inquiry programs. Participants of the CUSD classroom-based science-inquiry classes (n=5) mentioned that the program supported hands-on learning and inspired creativity in a supportive learning environment. However, they spoke less of its influence on their identity and understanding of who they are today. Participants of the nature-based programs reflected on how the program made them more aware of the world around them, developing in them a sense of place and appreciation for both science and the natural world. They also reflected more on the sense of community they felt when participating in the program and the gentle and compassionate support of the programs’ mentors and leaders.

Faber Taylor and Kuo (2006) discuss the ways in which interaction with the natural world can foster a sense of place and well-being and Kahn (2002) discusses the value of young people’s interaction with the natural world as it relates to their understanding of place and their role in caring for that place. Kahn (2002) cautions that without direct interaction with the natural world guided by knowledgeable mentors, children and youth may lose an important connection to something they never knew they had. Those familiar with PBE
literature may not find the findings of this study all that surprising with regard to the differences between the nature-based and classroom-based programs. This study’s findings in fact reinforce what PBE practitioners promote: that hands-on learning that is place-based can more fully promote development of the whole child (NWF, 2010). The findings of this study suggest that hands-on learning alone is not enough to foster a sense of place or awareness of the world. This learning must be done with a strong consideration for place and with intention to teach about the local and the tangible. Future research studies may look to explore the particular differences of these learning environments and provide suggestions for how science-inquiry programs might become more place-based.

Given our society’s current approach to public education and standardized testing, there is much to be learned from what is actually effective. When science is made accessible to all learners and they realize that it is in fact something within their reach, their innate interests can be encouraged and allowed to develop. This understanding of effective learning environments is not a unique finding of this study, but rather reinforces what others have known for quite sometime. David and Frances Hawkins have become well known for their philosophy on “messing about with science,” understanding “that children [can] learn very complex things if these things or ideas [are] presented in concrete and thoughtful ways” and that “children naturally [see] the world multidimensionally” (Kellogg, 2010, p61). When learning environments can tap into this innate understanding, children become engaged learners who will in turn become well-rounded and aware adults. With regard to shaping an identity of environmental stewardship, these findings also help strengthen the case for place-based education that is immersed in the natural world and allows a space for play, exploration and socialization.
**Sense of Place & Place Identity**

The findings from this study also contribute to several other areas of research related to children and youth’s interaction with the natural world. The development of sense of place and place identity was particularly prevalent among participants of the nature-based programs. When compared to the classroom-based programs through CUSD, these findings suggest that experience with the natural world is essential to development of sense of place and place identity.

Gruenewald (2003, p3) calls for a synthesis of critical pedagogy and place-based education, arguing that the two are “mutually supportive.” This study, with the application of Holland’s understanding of social practice theory, makes an attempt to understand the forces at play behind place-based education with a consideration for the influences of the sociocultural place. As evidenced by many of the nature-based participant narratives, these programs helped participants gain an appreciation for the natural world while also helping participants understand their place in relation to other humans and species. In support of Gruenewald’s (2003, p7) articulation of critical pedagogy of place, I believe the findings from this study suggest that such programs encouraged participants “to pursue the kind of social action that improves the social and ecological life of places, near and far, now and in the future.”

Clayton and Myers (2009, p63) explain the concept of place identity and its formation within an individual stating that in relation to place “identity comes from the way in which memories are intertwined with that place.” This study’s findings provide implications for understanding the ways in which place identity can be developed in children and youth who
participate in nature-based programs and how programs can help create an environment that will lend itself to both development of sense of place and place identity.

Additionally, this study’s examination of nature-based programs supports Kahn’s (2003, p113) call for “constructivist environmental education” as it worked to “recognize that children construct knowledge and values not only through interaction with the physical world (with nature) but through interaction with a social world and with social discourse.” The participant narratives support Kahn’s discussion as many participants recalled experiences that were tied up in both the natural and social world. Future research studies exploring the influence of place-based environmental education programs on participants might look to understand the different ways these programs support, or not, the local social world as well as the natural world as this may be a contributing factor in both the way the program is experienced and taken up as a part of one’s identity.

**Wilderness Experience**

The findings from this study related to the CUSD wilderness camp reinforces what other studies have found with regard to wilderness experience and the lasting influence such an experience can have on participants (Faber Taylor & Kuo, 2006; Kellert & Derr, 1998). What was unique about the CUSD wilderness camp participants was their repeated experience in the camp over several adolescent years. While other studies have explored wilderness experience, many of the programs explored reflect a one-time experience with the program(s) under study.
In line with Kellert and Derr’s (1998) findings on wilderness experience programs, the CUSD wilderness camp also had a significant influence on participants’ overall environmental awareness, attitudes and behaviors. However, given the expense of the programs their study explored, the experience is often a “once in a lifetime” event. The findings from this study suggest that when such programs are made financially accessible over several years, the influence can be just as impactful. The vividness of many of the CUSD wilderness camp participants’ recollection may be in part due to the repeatedness of their experience. Additionally, CUSD wilderness camp participants spoke often of the relationships formed and the positive socialization among peers and mentors. Future studies might look to explore smaller-scale wilderness experience programs that can offer repeated experience during adolescence, exploring the ways in which these programs not only contribute to environmental identity, but also one’s sociocultural identity.

**Care for Animals**

Care for animals was a recurrent theme particularly among Wild Bear participants. This finding reinforces past studies that suggest when children are given the opportunity to care for and interact with other species, their own sense of self is elevated (Clayton & Myers, 2009; Faber Taylor & Kuo, 2006; Myers, 2007). The CUSD wilderness camp participants who participated in trips to Mission: Wolf also spoke of the profoundness of that experience. The interaction with the wolves combined with the experience of the natural world provided a rich opportunity for these participants to reflect on their place in relation to other people, animals and the natural world. Myers (2007, p51) works to capture this sentiment stating that “we feel a sense of relation to other species that seem to have ‘someone in there’; and we can explain something of who we are in reference to them.”
Future studies might look to elaborate on how the care for animals within a natural setting might further contribute to development of an environmental identity and sense of self within the world. Place-based environmental education programs might look for ways to integrate this positive and direct interaction with animals as means to more fully establish their mission in instilling a sense of stewardship.

Adolescent Nature Experience

Participants of Thorne, Wild Bear and the CUSD wilderness camp who participated in these programs as adolescents, as either teen campers (CUSD) or teaching assistants (Thorne and Wild Bear), reflected on the influence their respective program has had in their life. Particularly with the CUSD wilderness camp, participants explained that in their perspective, their lives would be different, they would be different, had they not had that repeated experience with the program. I found this particularly striking given that much of the SLE and PBEE literatures present findings indicating the importance of early and middle childhood experiences, often not mentioning the importance of experiences in adolescence.

However, James, Bixler and Vadala (2010), Chawla and Derr (2012), and Chawla and Cushing (2007) have discussed how experiences in adolescence can be particularly influential with regard to environmental attitudes, beliefs and behaviors. Chawla and Cushing (2007, p440) explain that such experiences can become “antecedents of action” wherein young people gain both knowledge and action skills to help them become competent environmental stewards. All eight of the participants who had an experience with their program during adolescence, regardless of which nature-based program, professed a commitment to taking care of the natural environment. Chawla and Cushing (2007)
emphasize that it is imperative “for young people to see their efforts taken seriously by others and that they are able to realize at least some of their ideas.” Study participants often reflected on how empowered they felt by the adult leaders of their program and how their thoughts and ideas were heard. The findings from this study provide additional support for Chawla and Cushing’s (2007) discussion and reveal that when programs do provide a space to empower young people through both skill development and guided support that such programs and the people that lead them can have a profound influence on the lives of young participants for years to come.

From my perspective, such programs that offer adolescents repeated experience with the natural world are rare. In fact, the CUSD wilderness camp is no longer offered through CUSD and Thorne and Wild Bear’s programs offer limited opportunities for teens to participate outside of being a teaching assistant. This is in part due to the fact that teens often have other commitments, such as summer jobs, sport camps, or other extracurricular camps that help maintain or further skills for school year activities. However, this study suggests that experiences in nature during this time are quite important and can become a profound influence in these young people’s lives well into adulthood. Programs should look for ways to extend their programming to adolescents in a capacity that is both meaningful, constructive and holds opportunity for repetition. Future research studies can look to explore programs that offer repeated experiences for adolescents and the specifics of these programs that tend to influence not only participants’ attitudes, beliefs and actions, but their understood identities as well.
The findings of this study also provide an opportunity to understand environmental stewardship as a part of identity, formed through action and over time, and can extend the increasing conversation among conservation psychologists, social practice theorists and environmental educators. This study’s findings suggest that when young people engage in direct, hands-on learning with the natural world in a supportive environment, they are likely to develop interest, care, concern or action on behalf of the natural environment. The findings suggest that when these cares, concerns and actions are reinforced over time and by compassionate and caring mentors, these children and youth are more likely to maintain that care and concern and view themselves as contributing members of that sociocultural sphere. It is through this ongoing action, reinforcement and social and personal acceptance that they begin to understand these components as a core part of who they are.

I believe this perspective on environmental identity has largely been missing from the discussion around environmental and stewardship behaviors and only recently has it emerged within the literature as a significant component to understanding what influences behavior. We cannot understand what motivates people to act or not act unless we first begin to look at who they are, where they fit into their local sociocultural world, and how they arrived at that understanding. This study’s theoretical approach can contribute to sustainability and planning fields, researchers and practitioners alike, who are working diligently to analyze, design and promote healthy and sustainable communities.

Additionally, place-based environmental education programs must continue to emphasize direct experience in nature by providing a setting and learning environment wherein students can engage with the natural world freely, curiously, and with gentle direction. In doing so,
these programs will begin to lay a foundation on which future environmental stewards will build.

As detailed above, there were several interesting findings that emerged from this study that warrant further research, particularly with regard to identity formation. The repeated mention of participant mementos among the three programs suggests that keepsakes from experiences play an important role in reinforcing that experience over time. Holland and Lave (2009) touch on this as they explain people’s use of cultural artifacts or symbols to help reinforce particular behaviors and group-oriented action. Future research might look to explore the extent to which such mementos help thicken identity by triggering a recalled experience, particularly as it relates to solidifying environmental identity. Additionally, the findings related to adolescent experience warrant further research into how identities take hold or “crystallize” during this time of development (James, Bixler & Vadala, 2010). For many participants, it was their participation with the program during this time that contributed most to their understanding of who they are today. As Chawla (2009) and James, Bixler and Vadala (2010) have done, the findings from this study provides additional support for understanding how socialization within the natural world might contribute to a thickening of one’s environmental identity.

With regard to practice-based implications of this study, each of these programs has touched thousands of children’s lives over the years and the potential influence of the program and staff could be quite significant. There is a real need for programs like these explored here to remain in touch with participants over time to not only reinforce that experience, but to develop a relationship that just might be perpetuated over generations. I am sensitive to the
fact that many such programs function on a limited budget supported through donations and grant monies and simply may not have the resources to maintain contact over time. And while I am not the typical advocate of online social media, therein lies a possible affordable solution or direction for maintaining contact and increasing outreach. In so doing, former participants’ experiences might be reinforced, reminding them of a time when creativity, wonder and explorative play were allowed to run free.

**Study Limitations & Strengths**

In this section, I will explore the limitations I encountered while conducting this study. While there are strengths in exploring life experiences through narrative and using this meaning-making experience to understand the formation of identity over time, there are potential limitations in this type of approach as well. That being said, I will briefly touch on the strengths of this study’s approach that I experienced along the way.

As a first time primary investigator of a research study, I entered this study being open to suggestion and feedback from others who had already navigated this path. However, as my study began to evolve, I began to develop my own sense of researcher intuition and found myself gravitating more towards certain practices than others. I found the narrative interview process to be enjoyable, fascinating and rich. I felt that for the purposes of exploring experience and identity, it was the best approach for this study. While I learned much from the process of developing the participant survey, in the end it was quite time consuming and did not produce the same depth of experience I was able to garner through the interview process. I also began to notice how participants opened up to me through our conversation in a way that cannot be replicated through survey.
As researchers, I believe we must be sensitive to participants’ feedback and take into consideration the information they are offering for our research purposes. Because I was interested in experience and identity and I took the time to sit down with my participants to hear their story, I think they were more willing to share the details and rich memories of their experience. From my experience with this study, I began to realize that in today’s fast-paced culture, we often do not take the time to share stories or lived experience with those around us. We want quick feedback and immediate understanding. Future studies within social sciences should look to be sensitive to participant feedback and responsiveness, even if that means scaling down the number of participants to make the study feasible.

While difficult in terms of time and financial cost, retrospective studies or studies exploring experience could be complemented by longitudinal research. For example, Seidman’s (1998) approach to narrative research suggests a minimum of three interviews with participants that take place over time. Seidman (1998, p11) explains that through this process “people’s behavior becomes meaningful and understandable when placed in the context of their lives and the lives of those around them.” Setting up a study to model this interview style could look at how participants’ understanding of themselves and an experience, or set of experiences, evolves over time and through additional life experience and perspective. This approach could also be accompanied by ethnographic fieldwork that takes into account real time observations of behaviors, interactions and a variety of sociocultural and environmental settings.
Participants

The 21 participants I interviewed for this study were either identified by the program staff or responded to the postcard invitation. I assume that participants who remained in contact with or were remembered by program staff were more likely to have had a positive experience than those who did not, as all of the stories I gathered were positive in tone and reflection. Similarly, those willing to respond to the online survey and interview request were likely more supportive of the program in general. This study was based on voluntary participation and program database information, generated either from historical records or institutional knowledge, presenting an inherent limitation in the size, representativeness and possible bias of the population surveyed. To a certain extent, these limitations were unavoidable and “as a practical matter, the researcher is seldom in a position to guarantee that every element […] actually has a chance of being selected in the sample” (Babbie, 1973, p80). Thus, a limitation of this study is that those who participated not only remembered participating, but also generally had positive memories of the program, limiting my analysis to a positive bias. While there is a need to understand which aspects of these programs do not resonate with participants, this limitation was largely out of my control. As mentioned in the methods section, I made repeated attempts to get in touch with former participants for each of these programs. Time and financial limitations prevented me from pursuing these potential contacts any further.

Another significant limitation of this study is the lack of minority perspectives. This is in part a result of the participant database and the overall predominant Caucasian demographics of Boulder. The lack of minorities within environmental education and the movement as a whole has been a concern among these fields for some time. The lack of
environmental minority leaders and organization members is a concern that many conservation organizations and environmental educators are actively working to address and is not necessarily unique to this particular study. I want to note here that all of the programs that participated in this study are actively seeking ways to provide outreach to and support for underserved, at-risk and minority children and youth within the surrounding area.

While I had anticipated a much higher response rate on the survey in particular, the response rate did not necessarily come as a surprise. Each organization had dated contact information for former participants, most of which was parent phone and address, and almost no electronic contact information was available. Given that these programs took place over a span of many years, largely before email and online registration became an everyday, commonplace form of communication, I expected there to be a limited amount of up-to-date contact information. As a result, I have begun to wonder if this is not just unique to this particular study, but is instead a reflection of our modern culture? More and more, people and families are strapped for time, spread thin across a variety of commitments either out of choice or perceived duty. As such, the time people do have to themselves is rare and precious and, understandably, is unlikely to be spent on responding to an email or carefully reading a postcard survey request.

While the participant response rate from all programs was less than anticipated, I believe this limitation can also serve as an important finding for practitioners within nonformal education programs. If program directors and staff are interested in understanding the influence of their program on participants over time, they need to look for ways to maintain
contact. As I suggested earlier, online social networking could provide one avenue for doing this as could something as simple as hosting an annual alumni reunion.

When the program directors from Wild Bear and the CUSD wilderness camp did reach out to former students, the response and willingness to participate by those contacted was almost immediate. This indicates to me that program instructors can use their influence to remain in contact with these past participants which can in turn help future research studies looking to explore past experience and program influence. In hindsight, while I did have the endorsement of all three programs, had Oak, Jill or Deb reached out via a letter from the beginning, the response rate might have been higher among these programs. This touches on an additional point for these types of programs to maintain instructor and personnel continuity from year to year. This not only reinforces returning participants’ experience, but also helps build community within the program.

**Use of Labels**

I have no doubt that use of specific terms within the interview process may have influenced the responses I received, such as “environmental steward.” However, I feel that without specific use of such terms, it would have been much more difficult for me to understand the degree to which these individuals identify with such a label and the ways in which their program and life experiences have shaped their personal understanding of such a label.

**Geographic Location**

A possible limitation that others might cite of this study is its limited geographic location within Boulder County. While I included this geographical limit intentionally to better
understand the role of place, I can see how others might see this as a limitation to the suggested implications. What was significant and influential for a program in Boulder County might not be for a program in Denver, San Antonio or Chicago. However, the findings from this study suggest that the role of place is indeed important in shaping identity, especially environmental identity. Had I not had this geographic limit in place from the beginning, it is very likely it would have emerged on its own.

**Significant Life Experience Research**

Related to the idea of generalizability, a critique of SLE research in environmental education is that it comes across as prescriptive; that is, if an experience deemed worthy of replication is recreated or shared by all, the experience will no doubt be impactful to all (Gough, 1999; Payne, 1999). However, three decades of SLE research suggest the findings are remarkably consistent and that adults who possessed childhood experiences in nature are most likely to be today’s environmental stewards (Chawla & Derr, 2012). The application of social practice theory within the context of SLE, as applied by this study, may help to relieve this particular critique over time. Social practice theory provides a foundation for work on identity formation on which future SLE studies can build. While some might argue that this approach is still prescriptive, I understand social practice theory, particularly as it was expressed in this study, to elaborate on and explore the multiple ways we all develop in place and time.

In line with this prescriptive critique, there have also been concerns about generational experiences and how those experiences change over time and from decade to decade. However, these findings suggest that across decades and ages, certain experiences do remain
constant and salient, regardless of program type and technological advances. As supported by past SLE findings and social practice theory, real world experiences that foster and support hands-on learning, creative learning environments, positive and supportive mentors, and active and repeated engagement with nature have been important influences for people throughout history and over time. It is possible that these experiences will only increase in value and significance with ongoing advancements in technology and an increasingly plugged-in culture.

This study has helped address additional past concerns for SLE research, which have called for studies to be more reflective of the individual characteristics of each experience with an increased focus on women and people under the age of 30 (Gough, A., 1999). Through narrative interviews, social practice theory and exploration of identity, I believe this study satisfied the call for understanding individual experience. Additionally, many of the study’s participants were women and under the age of 30. While this was not a specific study aim, the findings here might suggest effective ways to explore these groups further.

**Reliability of Self-Reported Data**

One of the biggest critiques of qualitative and quantitative measures of SLE research and narrative interviews centers on the concern for accountability and reliability of memory. In psychosocial memory-related research, Clarke and Hoggett (2009) explain the significance of memory as an effective and reliable means for exploring autobiographical narratives and life experiences. As a researcher, one cannot explore life long influence without hearing from the individual who owns that experience. While observations are certainly important, especially with regard to behavior, one simply cannot follow study participants around for
years at a time without sacrificing one’s own life and sense of identity. Additionally, observation is just a part of understanding others’ experiences and behaviors. To echo the words of a personally beloved historical fiction character: “the most important thing about a person is always the thing you don’t know” (Kingsolver, 2009, p218).

Within psychosocial analysis, many researchers believe that lived experience is where research first begins and that the memory of that experience holds profound meaning for how we come to understand the interactions between us and others in this world (Alexandrov, 2009; Crociani-Windland, 2009). Chawla (2001) cites several memory-based studies that found that while the details of a story may change over time, the general content of the story remains the same. While I held only one interview with each participant, I found these explanations to ring true in their stories. It was often the case that when participants’ shared specific and vivid memories of an experience, they seemed to be carried in thought back to that place in time. Their inhibitions with me seemed to fade and their words and stories flowed without encumbrance. In life, the stories of lived experiences are what we have to go by, navigating the ways in which these experiences have taught us, and how these experiences are perceived and appreciated by those around us. A limitation it may be, but I trust the shared stories of these participants to be true and reflective their experience.

An important argument that Daniel (2003) makes is that individuals tap into particular memories at particular times during their lifespan when that memory might serve them best. For example, in times of struggle or loneliness, a person might recall an experience that filled them with a sense of comfort and coping. At that time, the resonance of that experience is
meaningful, useful and significant. Merriam and Clark (1993) explain that significant life experiences are shaped by how individuals reflect on those memories over time and at different points in life, certain experiences may be more significant and influential than others. As called for by Hsu (2009), this study has aimed to be concerned with the “phenomenological richness” that is inherent in SLE, narrative, and social practice theory research and the influence of experience on changes in perception, awareness, belief and behavior – how these changes are embodied in identity.

**Reliability & Trustworthiness**

This research study was largely exploratory and was not looking to prove, or even suggest, causality. In an effort to produce a study with results that can be considered reliable and trustworthy, I allowed the participant’s voice to explain individual experience and its influence on their life. While interpretation is certainly a component of any research endeavor, my aim has been to understand, to the extent that I am able, the experience participants have had with these programs as shared through their narrative interviews.

I initially proposed methodological triangulation, in the form of interviews and survey data analysis, along with interview member checking (e.g., participant confirmation) to help confirm the reliability and trustworthiness of the data and methods (Elliot, 2005; Johnson & Onwuegbuzie, 2004; Miles & Huberman, 1994; Seidman, 1998). However, as revealed in the method and findings chapters, this approach was not entirely successful due to the limited response rate of the survey. However, trustworthiness of the data collected has been based on the narrative of participants whose personal experience and perception of its influence have shaped the findings of this study (Elliot, 2005; Freeman, 2004). Seidman (1998, p17)
argues “if the interview structure works to allow them to make sense to themselves as well as to the interviewer, then it has gone a long way toward validity.”

**Generalizability**

Speaking against generalizability, many researchers who conduct narrative analysis caution strongly against generalizing and unapologetically question the need for it (Clarke & Hoggett, 2009; Elliot, 2005; Freeman, 2004). I entered this research process interested in the experiences of each program participant, particularly as it would be expressed through their individual narration. The ability to generalize within the programs as well as beyond was dependent on shared and emergent themes within participants’ story. Because place seemed to play a role in how participants perceived the program’s influence, I hesitate to generalize to programs outside of Boulder. However, the findings of this study suggest that future research should look to understand the role of place within the context of experience and identity. What emerged as the most significant and salient of experiences was the hands-on, experiential element of each program. While there were limitations in demographic diversity within this study, these findings suggest that such experiences can and do transcend program and place. For practitioners, this finding suggests that programs that look to include these elements of experience can be successful in having a lasting influence on participating children and youth. That being said, I do not want to discount the influence and particulars of place, instructors and uniqueness of each these programs.

Freeman (2004, p69) explains that “in addition to serving as vehicles for understanding the unique trajectories of individuals’ lives, they [life narratives] also serve as means of access to social reality, signifying the worlds through which people have moved.” Lindseth and
Norberg (2004, p147, emphasis in original) explain the extension of individual to collective experience as an idea of “original experience” or “basic relatedness to the world.” They go on to explain: “it is not a special kind of lived experience, but rather the foundation for all lived experiences, the prerequisite that lived experience reveals a world, that it has a meaning content” (p147). In terms of generalizing the findings of this study, many of these participants’ experiences were echoed across programs and there were certainly elements within their stories, particularly of those that spoke to socialization and community, that touched on this notion of shared human experiences. Often in qualitative research, it is difficult to provide generalizations or implications beyond the individual or specific social context studied (Elliott, 2005; Johnson & Onwuegbuzie, 2004). However, I think it is important to recognize that as human beings, we have the ability to relate to one another and therein lays the potential for qualitative research to reach beyond the context in which it has been conducted.

While these findings are limited in scope due to the limited number of interviews and surveys collected, it appears that early childhood and adolescent experiences with science may contribute more to the foundation of the pursuit of science than previously credited within STEM fields. With regard to our country’s educational system, there has been a national call to increase access and opportunity to STEM-related fields among primary and secondary school students. The findings of this study present an opportunity for future research to explore nonformal science programs as a way to understand how these identities are established and how such programs can help build success in STEM careers.
Limitations aside, I believe the findings of this study can make important contributions to both environmental education and STEM-based fields by way of understanding how students come to identify with the natural world and science. In addition to guiding attitudes, beliefs and actions, identity often plays a significant role in how we select our academic choice of study and career paths, should we be so fortunate to have the opportunity. Identity is requisite to success in any cultural sphere, be it academic, career, or lifestyle; if we can see ourselves in that role, we are more likely to continue its pursuit and active participation in it.

For practitioners in the fields of place-based environmental education and sustainability planning, the findings from this study suggest that the paths these fields are on can be well laid when there is strong consideration for place, community, and the natural world in which we all reside. These fields should continue to look for ways to increase direct, hands-on experience with nature in meaningful and relevant ways. These interactions serve as an important motivator for actively caring for the long-term sustainability of such places. The planning field should continue to look closely at place, both the built and natural environment, and the ways in which it both shapes and is shaped by individuals, their interactions with one another and other living species.

Postscript

In conclusion, it is my belief that the deeper understanding offered by this study provides affirmation for place-based environmental and science-inquiry programs that aim to influence lifelong learning, attitudes, beliefs, and behavior. As articulated by Furihata et al. (2007, p223), I too believe that “applying results obtained through SLE research to the
planning of educational activities in schools and communities, with their cooperation, [could be] an effective approach to enhance the sustainability of each community.”

I want to articulate again how appreciative I am of the programs, their directors, and staff for being open to this study. I truly view this to have been a collaborative effort to better understand the influence that each of these programs has had on past participants. I also have a deep appreciation for and gratitude towards the study participants who shared their time and personal stories with me. I hope that I have done justice to their words and their experience. Without their participation, there would be no stories to share, explore or ponder.

This study was an exercise in exploration of experience, both for me as a researcher and for past program participants. Maybe these participants now have a more grounded understanding of who they are through this process of reflection; or, maybe they have moved on, firm in their identities, dimly aware of our brief encounter. For me, my identity and sense of self has no doubt been enriched. I am much more aware of the countless influences on my life and identity through the presence of particular people, places and events. Whatever implications this research may have on the fields of environmental education and inquiry-based science learning, I know that for me this research journey has become hugely formative; formative in the way I will move forward in future research and formative in the way I will move forward in life: directly, with hands on, compassionately, and with a profound sense of wonder.
REFERENCES


APPENDIX A: Narrative Interview Cover Sheet

Interview Cover Sheet, SLE Study

Interview #:______________

Participant Name: ___________________________ Date: ____________________

Consent to Participate in Study:

Pilot:_______ Survey:_______ Follow-up (as needed):_______

Consent for program (Thorne or CUSD or Wild Bear) to use information for promotional purposes:_______

Selected Pseudonym for written analysis:________________________________________

Other notes:
APPENDIX B: Narrative Interview Prompt

<table>
<thead>
<tr>
<th>Interview #:</th>
<th>Pseudonym:</th>
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</thead>
<tbody>
<tr>
<td>Program:</td>
<td>Year(s) in Program:</td>
</tr>
<tr>
<td>Gender:</td>
<td>Ethnicity:</td>
</tr>
<tr>
<td>Location of Interview:</td>
<td>Time spent in Boulder County:</td>
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</tbody>
</table>

Narrative Interview Prompt:

“I am interested in hearing about your personal experience with the Thorne/CU Science Discovery program. Take a moment to recollect your experience and when you are ready to begin, please state what year and specific program you participated in. Feel free to take as much time as you need to share your reflections on your experience. I will not be asking you questions until you feel as though your story is complete, but I will be taking notes as you share.”

Follow-up questions:

“You mentioned that this program impacted your beliefs/attitudes. Can you say more about that?”

“You mentioned that this program influenced your behavior/actions. Can you elaborate?”

“You mentioned that this program impacted your career choice. Can you say more about that?”

“You mentioned that this program helped to shape your perception of the world. Tell me more about that and how so.”

How long did you and your family live in Boulder County?

Why did you choose this program? OR Why do you think your parents chose this program?

Have you reflected on this experience since? Often? How so? At what points in your life have you done so?

Do you think this program shaped how others perceive you? Did it shape how you perceive yourself?

“Who Am I?” Question: 20 words or phrases

Other Notes:
APPENDIX C: Survey Questions

This survey is a part of a larger study exploring the influence of childhood education on adult attitudes and lifestyle decisions. The purpose of this survey is to understand your experience with Thorne/Science Discovery as a past participant and to understand to what extent, if any, that participation was influential in your life. While your survey responses will remain anonymous, your participation in this survey indicates your consent to participate in this study. You must be 18 years of age or older to participate.

If you have friends who you recall participating in the program, please feel free to pass this survey along to them for their input.

This survey should take you approximately 30 minutes to complete. Please answer all of the questions to the best of your ability. Your participation in this survey is greatly appreciated!

General

1) What is your gender?
   Male
   Female

2) What is your main ethnic or racial heritage? (If you have more than one answer, please select the category with which you most identify)
   European-American/white
   African-American/black
   Hispanic-American
   Native American/First Nations/American Indian
   Asian-American
   Other

3) What is your year of birth?

4) What is your current occupation? (fill in the blank)

5) I have had or currently have a job in a science-related field.
   yes
   no

6) I have volunteered or currently volunteer for an environmental organization
   yes
   no

7) How long did/have you lived in Boulder County?
   <5 years
   6-10 years
   11-15 years
8) In which type of program did you participate (Thorne)? (select all that apply)
   Water/stream exploration
   Bird banding
   Nature exploration
   Nature art
   Camping-survival skills
   Biking/fishing skills
   In-school program
   Other (please specify)

8) In which type of program did you participate (CUSD)? (select all that apply)
   Nature exploration
   Wilderness-backpacking
   Lego®-engineering
   Rockets-astronomy
   Chemistry
   Physics
   Other (please specify)

9) How many years or summers did you participate in a program at CUSD/Thorne?
   1 year
   2-3 years
   4-5 years
   >5 years
   I don’t recall

10) What age(s) were you when you participated?

11) Did you participate in similar programs offered by other organizations?
   Yes
   No
   If yes, do recall which programs or organizations?_______________
<table>
<thead>
<tr>
<th>Based on my experiences with this program, I feel that…</th>
<th>Completely true of me</th>
<th>True for me</th>
<th>Neither true nor untrue</th>
<th>not true of me</th>
<th>Not at all true of me</th>
</tr>
</thead>
<tbody>
<tr>
<td>12) This program encouraged my creativity as a child.</td>
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</tr>
<tr>
<td>13) My parents, family members, or caregivers promoted my interest in the experience.</td>
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<td>14) The hands-on learning experience provided by this program helped me better understand science.</td>
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<tr>
<td>15) This program positively impacted my personal attitude towards hands-on science education.</td>
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<tr>
<td>16) I learned about different career paths in the science field during this program.</td>
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<tr>
<td>17) Participation in this program affected my academic choice of study.</td>
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<tr>
<td>18) I learned self-initiative, taking action on my own.</td>
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<tr>
<td>19) As part of this program, I felt I was doing something to improve the environment</td>
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</tr>
<tr>
<td>20) Participating in this program positively influenced my current environmental attitudes and actions.</td>
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</tbody>
</table>
21) I became interested in getting more involved in environmental issues.

22) Living in Boulder County positively influenced my current environmental attitude and actions.

23) Were any of your program experiences negative?

If you answered yes to the above question, please explain in the space provided below:

Environmental Identity Scale, Abbreviated (Clayton 2003, 2011)

Please indicate the extent to which each of the following statements describes you by using the appropriate number from the scale below.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at all true of me</td>
<td>neither true nor untrue</td>
<td>completely true of me</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

24) _____ I spend a lot of time in natural settings (woods, mountains, desert, lakes, ocean).

25) _____ I think of myself as a part of nature, not separate from it.

26) _____ If I had enough time or money, I would certainly devote some of it to working to protect the environment.

27) _____ When I am upset or stressed, I can feel better by spending some time outdoors “communing with nature”.

28) _____ I feel that I have a lot in common with other species.

29) _____ Behaving responsibly toward the earth -- living a sustainable lifestyle -- is part of my moral code.

30) _____ Learning about the natural world should be an important part of every child's upbringing.

31) _____ I would rather live in a small room or house with a nice view than a bigger room or house with a view of other buildings.
32) _____ I would feel that an important part of my life was missing if I was not able to get out and enjoy nature from time to time.

33) _____ I have never seen a work of art that is as beautiful as a work of nature, like a sunset or a mountain range.

34) _____ I feel that I receive spiritual sustenance from experiences with nature.

Have you reflected on this experience since? If so, how and why?

Other Comments:
Please provide any additional comments here about your experience with Thorne/CUSD that were not captured in the above questions or elaborate on what you have selected above. Once again, your participation in this survey is greatly appreciated!

This study is looking for willing survey participants to participate in a follow-up interview based off of your survey responses. If you are interested and would be willing to participate in a follow-up interview regarding your program experience, please provide your contact information below. Providing contact information does not guarantee that you will be contacted, but indicates willingness to participate if contacted. Participation is entirely voluntary: