

**MEMORIES AND LASTING IMPACTS OF RESIDENTIAL OUTDOOR
ENVIRONMENTAL EDUCATION PROGRAMS**

A Dissertation

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of Cornell University

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by

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MEMORIES AND LASTING IMPACTS OF RESIDENTIAL OUTDOOR
ENVIRONMENTAL EDUCATION PROGRAMS

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Youth environmental education (EE) is at least 40 years old and outdoor education is even older (Carter & Simmons, 2010). While few studies have documented the lasting impacts of these programs on youth participants as they have grown into adulthood, the broad goals of environmental education to inspire and enable life-long environmental stewardship necessitate such long-term research. Retrospective studies with environmentalists and environmental educators, as well as with the general public, suggest that childhood experiences in nature are linked to adult environmental attitudes and behaviors (Wells, & Lekies, 2012). These studies provide conceptual support for outdoor and environmental education, but do not document the lasting impacts of specific programs. This dissertation expands on prior research in interpretation (i.e., Knapp, 2007), investigating what past participants *remember* from a residential outdoor environmental education (ROEE) program, and draws on a new body of literature to explore how participants *use* these memories in subsequent years.

The first article (chapter) is a literature review that summarizes and critiques (1) studies broadly focused on life experiences that have influenced adult environmental attitudes and behaviors and (2) long-term evaluations of interpretive, outdoor education, and environmental education programs. The second article reports data from 45 retrospective interviews with adults who participated in a fifth-grade ROEE program between 1958 and 1992. This paper focuses on what participants remember from the experience, looking specifically at the characteristics of remembered program components. Experiences that were active, offered opportunities for

achievement, involved social interactions, and were both distinctive and applicable at home were found to be particularly memorable. The third article in this dissertation considers how people use their memories of ROEE, reporting the results of 54 retrospective interviews at two research sites with teens who had attended ROEE programs five years earlier. The psychological literature suggests that autobiographical episodic memories serve directive, social, and self functions (Bluck, 2003), and this dissertation research documents memories of ROEE being used to understand and appreciate wild nature, to direct outdoor recreation and environmental conservation behaviors, and to reminisce with friends. Considered together, the research presented in this dissertation offers insight into how current educators can design memorable programs and then encourage memory use.

References

- Bluck, S. (2003). Autobiographical memory: Exploring its functions in everyday life. *Memory*, *11*(2), 113-123.
- Carter, R. L., & Simmons, B. (2010). The history and philosophy of environmental education. In A. M. Bodzin, B. S. Klein, & S. Weaver (Eds.) *The inclusion of environmental education in science teacher education* (pp. 3-16). Dordrecht, Netherlands: Springer.
- Knapp, D. (2007). *Applied interpretation: Putting research into practice*. Fort Collins, CO: InterpPress.
- Wells, N. M., & Lekies, K. S. (2012). Children and nature: Following the trail to environmental attitudes and behavior. In J. L. Dickinson & R. Bonney (Eds.), *Citizen Science: Public participation in environmental research* (pp. 201-213). Ithaca, NY: Cornell University Press.

BIOGRAPHICAL SKETCH

Kendra Rose Liddicoat grew up in New York City loving the urban landscape and the excitement of so many people from so many places. Her parents, Susan and Joseph, always encouraged her interests in history, biology, and culture, a combination still evident in this dissertation. As a child she loved to read, travel around the City on the subway, and go to Girl Scout camp in the summer. She remained active in the local Girl Scout council all the way through high school, earning her Gold Award for leading a troop for teens with disabilities.

Kendra attended New York City public schools, including Stuyvesant High School, graduating in 1995. She earned a Bachelor of Arts in biology from Swarthmore College where she was a Lang Scholar for Social Action. Kendra also has a Master's of Science in recreation (concentrations: outdoor environmental education and therapeutic recreation) from SUNY Cortland and is a Certified Therapeutic Recreation Therapist (CTRS).

During the summer of 1997, Kendra took a job as the nature instructor at a camp for youth and adults with physical disabilities in central Indiana. After recovering from a bit of culture shock, she fell in love with her job, her campers, her co-workers, and everything that was Bradford Woods. She had discovered her twin passions for environmental education and working with people of all abilities in the outdoors. Four summers of camp, three seasons of outdoor environmental education, and one dissertation chapter later, she still has trouble containing her enthusiasm for Bradford Woods.

As a PhD student at Cornell University, Kendra had the opportunity to travel to South Africa for research on Garden Mosaics, learning much about human and natural diversity as well as Education for Sustainable Development. As part of her dissertation research, Kendra also spent a year traveling around the American West, living and working in the stunning Grand

Teton and North Cascades National Parks. For the past few years, Kendra has been teaching as adjunct lecturer at SUNY Cortland in the Recreation, Parks, and Leisure Studies Department and coordinating the program for youth and adults with developmental disabilities at Camp Whitman on Seneca Lake. Both experiences reinforced her enthusiasm for mentoring young adults as they begin their own journeys as environmental educators and therapeutic recreation specialists.

Kendra will be assuming an assistant professorship of environmental education at the University of Wisconsin-Stevens Point in August 2012 and is excited about embarking on this new adventure.

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I have met many wonderful people at Cornell. I am particularly grateful to Jennifer Shirk and Alex Kudryavtsev for true friendship, academic encouragement, research insights, and fun trips to conferences. I am so glad we ended up sharing an advisor and an office! Thank you also to Mia Park, Jay Boulanger, Heather Triezenberg, Elise Zipkin, and Ruth and Emily Mahr for making life in Ithaca so enjoyable. I hope we continue to cross paths!

My time at Cornell was bracketed by opportunities to learn and work at SUNY Cortland in the Recreation, Parks, and Leisure Studies Department, first as a master's student and graduate assistant and then later as an adjunct lecturer. I owe much to the faculty and students there. Thank you to Lynn Anderson for teaching me about research methods, working with me on my first research project, hiring and believing in me as a lecturer, inspiring me as a great leader, always encouraging my interest in outdoor therapeutic recreation, and pushing me to value and understand true inclusion. Thank you to Anderson Young for inspiring me as a terrific teacher, introducing me to environmental history and resource management, trusting me and mentoring me as I taught his classes, and organizing and facilitating such friendly and informative Coalition for Education in the Outdoors Research Symposiums. Thank you to Sharon Todd for sharing her course materials, mentoring me as I taught the research methods courses, reminding me that

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CHAPTER 1

INTRODUCTION

Youth environmental education (EE) is at least 40 years old, and outdoor education is even older (Carter & Simmons, 2010; Hammerman, 1980), yet few studies have documented the lasting impacts of these programs on participants as they have grown into adulthood.

Nonetheless, according to the North American Association for Environmental Education, “the ultimate goal of environmental education is the development of an environmentally literate citizenry” (NAAEE, 1999, p. 3), an objective much broader than creating immediate changes in knowledge, attitudes, and behaviors among youth participants. Retrospective studies with environmentalists and environmental educators, as well as with the general public, suggest that childhood experiences in nature are linked to adult environmental attitudes and behaviors (reviewed in Wells & Lekies, 2012, and in this dissertation). Such studies provide conceptual support for outdoor and environmental education, but do not document the lasting impacts of specific programs.

With access to a stable community with a nearly 50-year history of participating in a fifth-grade residential outdoor environmental education (ROEE) program, I decided to try collecting long-term data from adults about their childhood experiences. Expanding on Doug Knapp’s (2007) work in interpretation, I chose to focus on what past participants *remembered* of their experience. Based on the success of this first study, I expanded to two other research sites, interviewing teens about their fifth- and seventh-grade ROEE experiences.

The intention of my research was not merely to gather memories and their subsequent uses, as interesting as that was; I was also looking for patterns that would help current and future educators develop memorable programs. Previous evaluations of ROEE, all short-term, have

provided valuable documentation of overall program impact on knowledge and attitudes (Bogner, 1998, 2002; Johnson & Manoli, 2008, 2011; Stern, Powell, & Ardoin, 2008). Fewer studies have focused on instructional design, especially in light of learning or memory theories. My research draws on psychological research on the formation and retention of episodic (event-specific) memories and on the uses of autobiographical episodic memories to offer new insights to educators seeking to create memorable programs that continue to influence participants throughout their lives.

This dissertation is comprised of three distinct papers. The first, “Research on the Long-Term Impacts of Environmental Education,” is a review prepared for the *International Handbook of Research on Environmental Education* (Stevenson, Brody, Dillon, & Wals, in press). It summarizes and critiques (1) studies broadly focused on life experiences that have influenced adult environmental attitudes and behaviors and (2) long-term evaluations of interpretive, outdoor education, and environmental education programs.

The second paper, “Memories from 47 Years of Outdoor Education Experiences,” reports data from 45 retrospective interviews with adults who participated in a fifth-grade ROEE program between 1958 and 1992. This paper focuses on what participants remember from the experience, looking specifically at the characteristics of remembered program components. Experiences that were active, offered opportunities for achievement, involved social interactions, and were both distinctive and applicable at home were found to be particularly memorable. The analysis of data from this site focused on memory, as opposed to perceived impacts or current behaviors (also collected), because of the extended period of time between when the program was experienced and when the interviews were conducted.

The third paper in this dissertation, “Memories of Residential Outdoor Environmental Education: How Are They Used?” considers how people use their memories of ROEE, reporting the results of retrospective interviews at two research sites with teens who had attended ROEE programs five years earlier. The psychological literature suggests that autobiographical episodic memories serve directive, social, and self functions (Bluck, 2003), and my research documents memories of ROEE being used to understand and appreciate wild nature, to direct outdoor recreation and environmental conservation behaviors, and to reminisce with friends. Data were also collected regarding what participants remembered of the program; these were analyzed for use by the research sites but are not reported in this dissertation due to theoretical overlap with the other study described above (paper two).

The overarching research questions explored by this dissertation are:

1. What do participants remember from a ROEE experience and why?
2. How have past participants used their memories of a ROEE experience?

My hope is that my findings will help current ROEE programs improve and encourage future researchers to continue investigating these and other questions related to the long-term impacts of youth EE.

References

Bluck, S. (2003). Autobiographical memory: Exploring its functions in everyday life. *Memory*, *11*(2), 113-123.

Bogner, F. X. (1998). The influence of outdoor ecology education on long-term variables of environmental perspective. *Journal of Environmental Education*, *29*(4), 17-29.

Bogner, F. X. (2002). Influence of a residential outdoor education programme to pupil's environmental perception. *European Journal of Psychology of Education*, *17*(1), 19-34.

- Carter, R. L., & Simmons, B. (2010). The history and philosophy of environmental education. In A. M. Bodzin, B. S. Klein, & S. Weaver (Eds.) *The inclusion of environmental education in science teacher education* (pp. 3-16). Dordrecht, Netherlands: Springer.
- Hammerman, W. M. (Ed.). (1980). *Fifty-years of resident outdoor education: 1930-1980: Its impact on American education*. Martinsville, IN: American Camping Association.
- Johnson, B., & Manoli, C. C. (2008). Using Bogner and Wiseman's Model of Ecological Values to measure the impact of an earth education programme on children's environmental perceptions. *Environmental Education Research, 14*(2), 115-127.
doi:10.1080/13504620801951673
- Johnson, B., & Manoli, C. C. (2011). The 2-MEV Scale in the United States: A measure of children's environmental attitudes based on the Theory of Ecological Attitude. *Journal of Environmental Education, 42*(2), 84-97. doi:10.1080/00958964.2010.503716
- Knapp, D. (2007). *Applied interpretation: Putting research into practice*. Fort Collins, CO: InterpPress.
- North American Association for Environmental Education (NAAEE). (1999). *Excellence in environmental education: Guidelines for learning (K-12)*. Washington, DC: NAAEE.
- Stern, M. J., Powell, R. B., & Ardoin, N. M. (2008). What difference does it make? Assessing outcomes from participation in a residential environmental education program. *Journal of Environmental Education, 39*(4), 31-43.
- Wells, N. M., & Lekies, K. S. (2012). Children and nature: Following the trail to environmental attitudes and behavior. In J. L. Dickinson & R. Bonney (Eds.), *Citizen Science: Public participation in environmental research* (pp. 201-213). Ithaca, NY: Cornell University Press.

CHAPTER 2

RESEARCH ON THE LONG-TERM IMPACTS OF ENVIRONMENTAL EDUCATION

Kendra Liddicoat and Marianne E. Krasny

INTRODUCTION

Current widespread interest in the relation of spending time in nature to the healthy development of children and adults throughout the life span has sparked re-evaluation of environmental education (EE) approaches and research goals. One such re-evaluation has focused on the importance of considering the lasting impacts of EE programs, as one approach to connecting children with nature. Among practitioners, there is renewed enthusiasm for goals that reach beyond influencing short-term behaviors or meeting science education standards, and include ideas such as “lighting a spark” or “inspiring lifelong environmental stewardship.” In this chapter, we review the data collection methods and findings from two research approaches that address this need to document long-term impacts of EE.

Our focus is on research conducted months, and where possible, years *after* an experience rather than at the conclusion of an EE program. The first approach, which we refer to as significant life events, focuses on life experiences that have led to later adoption of pro-environmental attitudes and life-styles and involvement in environmental action. This literature includes both the narratives gathered by Significant Life Experiences (SLE) researchers and more quantitative studies linking childhood experiences with adult attitudes and behaviors. The second research approach is retrospective program evaluation, much of which is based on long-term memory theory. Most of these studies focus on outdoor education experiences. Taken together, these two bodies of literature offer insight into the types of experiences that promote environmental stewardship, whether environmental education programs provide such

experiences, and how effective environmental education programs are in meeting their long-term stewardship behavior goals.

A discussion of long-term research must first consider how long is long-term. For research on significant life events, the time frame is necessarily quite fluid because study participants of different ages are being asked to reflect on experiences that occurred across their life span. In terms of program evaluation, time frames in the literature range from six months (e.g., Bogner, 1998; Smith-Sebasto & Oberchain, 2009) to over 17 (e.g., Gass, Garvey, & Sugerman, 2003) and even 45 years (Liddicoat, 2012), but there has been little discussion of how time frames were, or should be, selected. The most common determining factors likely have been logistical--availability of research participants and length of time allotted for the study.

For the purposes of this chapter, we have selected one year post-program as our distinguishing line between short- and long-term studies. This fits the general distinction in the existing literature between studies gathering additional (post-post-test) data for comparison to pre-post test data and those focused specifically on memories and lasting impacts. As the body of literature grows, we encourage researchers to choose the length of time between the experience and the research not just based on logistics, but also on theory and common sense. For example, developmental psychology suggests time frames over which participants are likely to have matured sufficiently to put environmental education learning into practice and contextual factors that change over the life span (e.g., local regulations about recycling) also influence an individual's ability to act in an environmentally responsible manner. Other decisions about methodologies—for example the use of memory theory to provide insight into the stability and accuracy of memories and reflections over time—have implications for the ability to deal with the intervening variables that are unavoidably present in long-term research. Current literature on

significant life events or lasting impacts provides limited explanation and justification for methodological decisions.

METHODS

A variety of techniques were used to locate the studies reviewed in this chapter. Much of the SLE literature was published in *Environmental Education Research* in three issues (volume 4(4), 1998; volume 5(2&4), 1999). References lists from these articles were used to locate and review earlier studies. More recent SLE studies were located by browsing journals such as *Environmental Education Research* and the *Journal of Environmental Education*, reading the literature review sections of related articles and searching for the works cited, and talking with researchers and professionals at conferences. Similarly, retrospective program evaluations were discovered and chosen for inclusion in the review through browsing relevant journals, searching databases and library catalogs, talking with other researchers, and looking for works cited in other papers. The vast majority of the data papers and critiques summarized in this article are from peer-reviewed journals. The few reports and theses included were selected for their particular relevance to the subject matter. Related bodies of literature considered but discussed only briefly in this chapter are the personal-growth impacts of outdoor adventure programs, the short-term impacts of outdoor environmental education, the short-term impacts of EE programs of extended duration, and memory theory. Overall, there is an emphasis on outdoor environmental education due to the authors' interests and experience, but no articles on school-based EE were located and intentionally excluded. Confirmatory searches (conducted in July 2012) of *PsychINFO*, *ERIC*, and *ISI Web of Science* for “significant life experience*” and for “environment* education AND long-term,” and “environment* education AND impact” yielded no additional peer-reviewed articles on SLE or long-term impacts of EE.

SIGNIFICANT LIFE EVENTS RESEARCH

Significant Life Experiences (SLE) research began with Tanner's (1980) qualitative study that asked environmental activists in the United States to reflect on what led them to their current role. Responses emphasized childhood experiences in nature. Additional studies were then conducted in multiple countries with environmental educators and activists using both qualitative and quantitative methods. A full review of the early studies (pre-1998) can be found in Chawla (1998a, 1998b), and Table 1 summarizes the more recent work. Overall, childhood outdoor experiences remained salient across many cultures; other significant influences on adult environmental attitudes and behaviors included work, other people, exposure to pollution, and education (in varying orders) (Chawla, 1999; Corcoran, 1999; Palmer & Suggate, 1996; Palmer et al., 1998; Palmer, Suggate, Bajd, & Tsaliki, 1998; Palmer, Suggate, Robottom, & Hart, 1999; Sward, 1999). Building on these studies, more recent work in Asia has explored similar questions using mixed methods with control groups. Furihata, Ishizaka, Hatakeyama, Hitsumoto, and Ito (2007) compared environmental educators (n=188) with general citizens (n=25) in terms of current responsible environmental behaviors and significant life experiences. Few significant differences were found, but many of the SLE categories noted in other studies were evident in the narratives collected from a subgroup of the educators. Hsu (2009) also compared environmentally active citizens (n= 277) with a control group of non-active citizens (n=153) and found that 17 SLEs, including time spent in nature, participation in environmental organizations (some of which provided opportunities for time in nature), friends involved in environmental organizations and action, and loss of beloved natural places, among others, could explain 55% of the variance in environmental activism. Hsu (2009) rightly claims that this figure is much higher than generally found in studies linking environmental literacy to environmental action, a finding

with significant implications for environmental educators designing programs. However, this comparison suffers from the fact that SLE combines 17 factors, which may be difficult to integrate into any one experience (supporting the need for cumulative experiences over a life time rather than one-time experiences). Interestingly, Hsu (2009) found that whereas contact with nature was the most often cited SLE among environmental activists, non-activists also rated this factor as among the most significant of their life experiences. Thus in the comparison between the two groups, contact with environmental organizations and friends, and loss of a significant natural place, differed most between the activist and non-activist group, although all 17 factors differed significantly between the two groups. Such results point to the need for continued comparative research using controls.

Table 1. Research on significant life events.

Authors	Date	Data Collection Methods	Site	Sample	Results
Palmer, Suggate, Bajd, & Tsaliki	1998	autobiographical narratives	UK, Slovenia, Greece	environmental educators, n=575	Most common influences in Slovenia were people, pollution, and childhood time in nature. Most common influences in Greece were pollution, childhood time in nature, and work.
Palmer, Suggate, Bajd, Hart, Ho, Ofwono-Orecho, Peries, Robottom, Tsaliki, & Van Stadden	1998	autobiographical narratives	9 countries	environmentally active individuals, n=1259	Across sites (Australia, Canada, Greece, Hong Kong, Slovenia, South Africa, Sri Lanka, Uganda, and UK), the most influential factors in descending order were experiences of nature, people, education, witnessing negative situations, work, and media.
Palmer, Suggate, Robottom, & Hart	1999	autobiographical narratives	UK, Australia, Canada	environmental educators, n=363	Childhood time in nature, other people, work, and education were described most frequently as influences on current pro-environmental activities.
Sward	1999	survey, structured interviews	El Salvador	environmental professionals, n=17	In descending order, childhood time in nature with family or friends, witnessing environmental destruction, formal education, and organized outdoor experiences were described as significant influences.
Corcoran	1999	autobiographical narratives	USA	environmental educators, n=510	Study explored individual narratives in greater depth to understand the variety of outdoor experiences and family/friends who were influential.
Chawla	1999	open-ended interviews	Norway, USA	environmentalists, n=56	Most respondents described multiple influences with childhood experiences in nature, family, and membership in related organizations being mentioned most frequently.
Sivek	2002	focus group, questionnaire	USA	youth environmentalists, n=20+64	Influences on current levels of environmental sensitivity were grouped by role models, environmental influences, and personality. Teachers, parents, time outdoors, and being outgoing were most frequently cited as influential.

Furihata, Ishizaka, Hatakeyama, Hitsumoto, & Ito	2007	workshops, interviews	Japan	environmental educators n=188, and other citizens n=25	Significant life experiences occurring both in childhood and adulthood included (in descending order) experiences in nature, loss of nature, family, and books/media. Due to sample sizes, there were no significant differences between study groups.
Hsu	2009	autobiographical narratives, surveys	Taiwan	educators/civil servants n=40 narratives, n=81 & n=430 surveys	Narratives revealed 17 categories of influence which were shown to be significantly different among environmentally active and apathetic survey respondents.
Arnold, Cohen, & Warner	2009	Interviews	Canada	young environmentalists (16-19 yrs), n=12	Influences on current environmental activism included people (parents, friends, role models, and teachers), outdoor experiences, school, and youth conferences.
Lohr & Pearson-Mims	2005	national telephone survey	USA	adults, n=2004	Active gardening in childhood, passive interaction with plants, environmental education, and a home with natural surroundings in childhood were correlated with positive attitudes toward trees and participation in gardening in adulthood.
Ewert, Place, & Sibthorp	2005	scale (NEP)	USA	college students, n=576	Appreciative outdoor experiences in childhood were related to eco-centric beliefs while consumptive outdoor experiences were related to anthropocentric beliefs with both variable combined explaining 8.4% of the variance.
Wells & Lekies	2006	national telephone survey	USA	adults, n=2004	Active participation with wild nature and to a lesser extent participation with domesticated nature in childhood predicted pro-environmental attitudes and behaviors in adulthood. Environmental education predicted neither.
Thompson, Aspinall, & Montarzino	2008	focus groups, close-ended questionnaires	UK	adults, n=798	Higher and lower frequency of visits to woodlands in childhood predict corresponding frequencies in adulthood. Demographic variables including gender and proximity to woodlands were also influential.

Despite, or perhaps because of its breadth, the SLE literature has been criticized on a number of fronts. Critics have noted inconsistency in sample selection, data collection, and data analysis within and across studies and sites as well as a lack of attention to cultural differences among study participants (Chawla, 1998a; Dillon et al., 1999; Tanner, 1998). Considering the larger premise of SLE research, A. Gough (1999) also questions how much the childhood experiences of today's adults can tell us about the experiences of today's children. Sivek (2002) began to address this problem by interviewing and surveying high school students (rather than adults) about the significance of time outdoors, role models, and personality in determining current environmental sensitivity. His results mirrored other SLE research with time outdoors and people ranking most influential. Delving deeper with youth environmental leaders, Arnold, Cohen, and Warner (2009) again found that time outdoors and role models were influential while also emphasizing the importance of friends, peers, and youth conferences. However, a persistent issue for studies such as these that respond to A. Gough's (1999) critique is that while a shorter time frame between childhood and the evaluative research makes the findings more relevant to today's youth, it also limits the time during which such experiences could have had a significant influence on life.

SLE research has been primarily descriptive and interpretive, rather than strongly informed by existing theories. As Chawla (1998a) notes, a qualitative approach was beneficial because it added depth to our understanding of the individual and emotional side of environmentalism at a time when most research was quantitative. However, the self-referencing nature of the research has led to calls for greater consideration of theory, including autobiographical memory theory (Chawla, 1998a; N. Gough, 1999) and theory related to the role of identity and culture in research and practice (Dillon et al., 1999). Such theoretical work based

on SLE data is beginning, with an emphasis on the process by which experiences with nature are influential. Chawla (2007) used attachment theory and ecological psychology in combination with her SLE data to propose a model illustrating the progressive benefits of free play in nature. In this model, mobility (freedom to explore), access to natural environments, and successful engagement with natural processes leads to a continuing spiral of learning and involvement, especially when supported by an interested adult. Considering experiences in both childhood and adulthood, James, Bixler, and Vadala (2010) have also proposed a model based on their own SLE interviews (n=61 including 10 control subjects). Their work suggests that there are four sequential stages of involvement with nature leading up to an adult natural history related vocation: (1) direct experience dominant, (2) emerging formalized skills, (3) role awareness, and (4) identity formation. Additional studies that refine, validate, and expand these models may offer a new direction for additional SLE research with a more direct application to environmental education.

Several recent studies have also begun to use quantitative methods to gather data from the general public, thus looking beyond SLE's exclusive sampling of environmentalists. These studies mirror SLE results and, in some cases, begin to collect data specifically on environmental education. Survey research by C. W. Thompson, Aspinall, and Montarzino (2008) in Scotland (n=339) and England (n=459) found that frequency of childhood visits to green spaces was highly correlated to frequency of adult visits. Looking more closely at types of childhood outdoor experiences in relation to adult attitudes, Ewert, Place, and Sibthorp (2005) found that for a sample of U.S. college students (n=533), appreciative outdoor experiences in childhood were related to an eco-centric perspective, while consumptive outdoor experiences were related to anthropocentric beliefs. Attitudes were measured using the New Environmental Paradigm

scale (Dunlap, Van Liere, Mertig, & Jones, 2000). Interestingly education and involvement in environmental/outdoor organizations were not significant predictors of eco-centric beliefs in Ewert et al. (2005), although involvement in environmental organizations and to a lesser extent education were significant factors differentiating environmental activists and non-activists in a study in Taiwan (Hsu, 2009).

Lohr and Pearson-Mims (2005) drew on results of a national survey (n=2004) and found that a variety of childhood experiences, including active participation with nature, EE, and gardening, were correlated with positive views toward trees and interest in gardening in adulthood. Wells and Lekies (2006) used the same data set to examine the link between environmental experiences and adult attitudes and behaviors. Childhood participation with nature (wild and domestic) was significantly correlated with adult environmental attitudes and behaviors, but participation in childhood EE per se was not a significant predictor of either. Wells and Lekies (2006) suggest that EE may not have been properly operationalized to include hands-on, outdoor EE. Therefore, additional research is needed to understand the possible connection between specific types of EE and pro-environmental attitudes and behaviors.

Wells and Lekies (2006) and Ewert et al. (2005) begin to address concerns about the paucity of theory framing or emerging from significant life events research. Wells and Lekies (2006) draw on life-course perspective and Ewert et al. (2005) use the New Environmental Paradigm (NEP) in their work. Other theories brought to bear on SLE research include sense of place (C. W. Thompson et al., 2008). Each of these theories merits further investigation, especially in relation to their explanatory and predictive power. However, no consistent theoretical framework for SLE and related survey studies has emerged to date.

Taken together, SLE and quantitative large sample survey studies provide information on the types of childhood experiences that lead to adult environmental attitudes and behaviors. This big picture can help environmental educators appreciate the importance of time spent in nature and can encourage them to think broadly about the types of experiences their programs might incorporate. However, what the studies summarized in this chapter do not do is provide concrete information on whether specific types of environmental education programs, lessons, or activities have a long-term influence. For example, questions related to the long-term outcomes of engaging in issues-based lessons, or of the social component of an outdoor education experience, are not addressed. Gathering this information requires more focused research with individuals who are known to have participated in an environmental education experience and, therefore, have the potential to be influenced by it.

RETROSPECTIVE PROGRAM EVALUATIONS

The second major research tradition focusing on long-term impacts of EE is retrospective evaluation of specific educational programs, which is summarized in Table 2. In comparison to SLE research and surveys of the general public, retrospective evaluation research focuses on a clearly defined experience, and in cases where memory research is included in such studies, often goes deeper than the general EE program to focus on the specific activities. Where the EE programs are voluntary (e.g., participant-paid Outward Bound programs), information is gathered from participants with environmental interests, while in school-based programs such as those at outdoor education centers that serve entire grades, information is gathered from participants with a diversity of environmental perspectives.

In a major mixed methods study of Outdoor Adventure Education (OAE) programs, Kellert (1998) found that such programs had wide-ranging impacts as perceived and reported by participants. Impacts included increased interest in outdoor recreation activities, more positive environmental attitudes, commitment to conservation, desire to learn about nature, and personal well-being, self-confidence, and initiative, but had little impact on ecological knowledge or conservation behaviors. Perhaps most strikingly, nearly all the survey respondents repeatedly referred to their OAE course as being a life changing experience and one of the most important experiences of their life (Kellert, 1998). Other studies in similar settings have also documented lasting program impacts in terms of personal and professional growth, in part due to interactions with the natural environment, but have not explored environmental attitude and behavior outcomes in depth (Ballard, Shellman, & Hayashi, 2006; Daniel, 2007; Gassner, Kahlid, & Russell, 2006).

To better understand how EE-related outcomes might be achieved through OAE, D'Amato and Krasny (2011) asked past participants in Outward Bound and National Outdoor Leadership School about the program attributes that contributed to their transformational experiences. Respondents indicated that living in pristine nature, experiencing a different lifestyle (and breaking with normal life), experiencing a community of individuals undergoing the same experience, and the intensity and challenge of the outdoor course, were the key factors contributing to their transformations. However, participants commonly experienced difficulties in transitioning back to their normal life in the absence of the on-course community, factors which could influence the impact of outdoor experience on longer-term environmental behaviors (D'Amato & Krasny, 2011). Looking at a program that incorporates both outdoor adventure and environmental science, Everson (2000) interviewed former participants in the Teton Science

Schools month-long high school program up to 30 years after the experience. The data showed that the participants currently demonstrated positive outdoor recreation and environmentally responsible behaviors, and perceived that the program impacted their outdoor and, to a lesser extent, their environmental behaviors.

Turning to school-based EE, Hanson (1993) examined cumulative and enduring impacts on knowledge, attitudes, and behaviors related to energy conservation among sixth-grade students who had participated in multiple energy education programs throughout elementary school. Comparisons between participants and non-participants revealed consistently higher scores among participants in all three outcome areas (energy conservation knowledge, attitudes, and behaviors), and comparisons among participants showed that the greater the number of educational components experienced, the higher the scores. Peacock (2006) also looked at a program with repeated exposure, but rather than focusing on classroom activities, this study investigated an outdoor stewardship program in which classes repeatedly traveled to a land trust area. Follow-up interviews with high school students revealed a continued attachment to the natural area where they had conducted stewardship activities, continued visits (outside of school and with family and friends) to the stewardship site, concern about sustainability issues in their community, perceived increased self-esteem and other social skills due to the program, and knowledge of context-specific information. Program participation did not seem to have led to greater concern or knowledge about larger, global environmental issues, however.

Table 2. Retrospective program evaluations.

Authors	Date	Data Collection Methods	Site	Sample	Results
Hanson	1993	quantitative scale, up to 6 years post program	USA	youth (11-12 yrs), n=1349	Students who had participated in a greater number of energy conservation curriculum units reported greater energy conservation knowledge, attitudes, and behaviors.
Everson	2000	Telephone survey, 1-31 yrs post program	USA	adults, n=162	Participation in a month-long outdoor environmental science education program positively influenced subsequent outdoor recreation behaviors (ORB) and to a lesser extent environmentally responsible behaviors (ERB).
Gass	2003	observation, telephone interviews, 17 yrs post-program	USA	adults, n=16	Participants in a wilderness-based college orientation program indicated that the experience helped them challenge assumptions and develop a network of friends. The program continued to have a positive influence even post-graduation.
Peacock	2006	focus groups	UK	youth, n=108	Experience with school-based guardianship programs in wild areas positively impacted attitudes toward the environment, increased related knowledge, and may have influenced behavior.
Knapp & Benton	2005	Telephone interviews, 2 yrs post-program	USA	adults, n=6	Adults who had participated in a one-hour interpretive program recalled visual images, active and novel program components, and impressions of the interpreter.
Knapp & Benton	2006	Telephone interviews, 1 yr post-program	USA	youth (10-11 yrs), n=10	Students who had participated in a week-long residential outdoor EE program recalled activities, specific program content, and emotional reactions to the experience.
Farmer, Knapp, & Benton	2007	interviews, 1 yr post program	USA	youth (9 yrs), n=15	Students who had participated in a day-long EE program at a National Park recalled activities and knowledge learned. Data also revealed some impact on pro-environmental attitudes.
Liddicoat	2012	interviews 13-45 yrs and 5-7 yrs post program	USA	adults n=45, youth n=52	Participants in a 3-day residential EE program recalled the novel, active, social, and personally engaging components of the trip. Impacts included personal growth, new friendships, enthusiasm for natural settings, and science learning.

A major challenge inherent to retrospective evaluation studies is linking current attitudes and behaviors to specific experiences in the past, given months and often years of intervening experiences. As a result, some researchers have begun to draw on memory theory and gather episodic memories of EE experiences as evaluative data (e.g., Knapp & Benton, 2006; Liddicoat, 2012). Memories can be collected many years later and reveal which aspects of the program participants have retained over time (Knapp & Benton, 2005). Episodic memories are also, by definition, event specific (Baddeley, 2001), thus reducing some of the ambiguity regarding how closely linked the retrospective data are to the program itself. Through their specificity and in combination with existing theory, episodic memories also shed light on teaching practices that will promote long-term retention of knowledge, attitudes, and behaviors. Psychology research indicates that experiences that are novel, repetitive, active, and emotional are particularly memorable (Christianson & Safer, 1996; Herbert & Burt, 2004; Linton, 1982; C. P. Thompson, Skowronski, Larsen, & Betz, 1996; Zimmer et al., 2001). Retrospective research in EE can provide insight into how well our field is effectively incorporating these program characteristics to create lasting memories.

Research focused on subjects' remembering and reminiscing about an EE experience also provides an opportunity for past participants to reflect on why program elements were memorable to them and, with the benefit of hind-sight, explain how the environmental education experiences under discussion have had a lasting impact. The potentially causal link between memories and continued impact is an area still open to exploration through retrospective studies of EE. Psychology theories suggest that episodic memories may serve a social function (fostering interactions through reminiscing), identity function (allowing for awareness of one's

capabilities), or directive function (informing future actions) (Bluck, 2003). Episodic memories also can enable an experience to grow in impact over time as one is repeatedly reminded of what was learned through encounters that bring the experience to mind, a process called retrospective causality (Pillemer, 1998). Although theories can rarely be translated fully from one field to another, memory-based retrospective research in EE has the potential to make a valuable contribution to a body of literature in EE that has been criticized for being theory poor.

Memory studies in EE grew out of work in museum studies (e.g. Hudson & Fivush, 1991) and were initially conducted by Doug Knapp and colleagues. Knapp and Benton (2006) observed a five-day Expedition Yellowstone! program for fifth graders, and then contacted participants by phone one year later. The former students (n=10) were able to relate specific information about games they played and to describe aspects of program content, as well as talk about the positive and negative emotional aspects of the trip. Interviews with past participants in single day EE programs (in Hoosier National Forest and the Great Smoky Mountains National Park) revealed a similar ability to recall specific program knowledge gained through activities (Farmer, Knapp, & Benton, 2007; Knapp & Benton, 2005). Memories of emotional experiences during these shorter trips did not emerge as a theme, perhaps because opportunities for this type of engagement are more limited in a day rather than overnight program (Liddicoat, 2012).

Extending the time-frame between program experience and retrospective data collection, we (the authors of this chapter) have conducted additional memory-based research on residential outdoor environmental education programs for upper elementary school students ages 10-12 (Liddicoat, 2012). An exploratory study conducted in 2005 with 45 individuals who participated in a three-day natural history EE program between 1958 and 1992 revealed that not only do adults remember such short experiences, but they also recall specific lessons, people, and

opportunities for personal growth. Impacts and memories were relatively consistent across the decades, including among current high school students (n=37) who were surveyed to validate the results from the older participants, in light of A. Gough's (1999) concern that significant experiences for today's youth may differ from those of older adults. Most memorable were the active, social, personally challenging, and novel components of the trip. Stated impacts included becoming more knowledgeable about and comfortable in the outdoors, making and maintaining friends, and developing a sense of independence by spending the night away from home. Research at two additional sites with teens who had participated in similar residential outdoor environmental education programs five and seven years prior to the study revealed similar themes. These latter studies also explored in greater depth what function these memories served. For many participants, their memories served a social function enabling them to reminisce with friends and classmates, as well as a directive function by fostering an awareness of local natural history, increased interest in outdoor recreation, and more pro-environmental attitudes and behaviors. However, further research is needed to fully understand the link between the rich memories created by an EE experience and their usefulness to the individual who possesses them, as well as how individuals apply them toward pro-environmental behaviors despite potential constraints in their life or community.

The relative scarcity of retrospective evaluations designed to assess lasting impacts may reflect the difficulty of conducting such research. In our highly mobile society, locating participants years after an experience and convincing participants who disliked or have forgotten the experience to be surveyed or interviewed is difficult. This may introduce significant selection bias (Shadish, Cook, & Campbell, 2002), similar to that in SLE research. Internal validity is also compromised by issues of self-report, socially desirable responses, and possible intervening

variables (Kerlinger & Lee, 2000). A focus on memory, which is inherently tied to a specific event, is personal, and is perhaps less value-laden in the eyes of participants, can help but does not fully remove these threats to validity. Memory also introduces new sources of error, related to the accuracy of memories and the varying speeds at which people forget positive, negative, and emotional experiences (C. P. Thompson et al., 1998). A focus on remembered events also emphasizes overt learning at the expense of learning that occurred without people realizing it.

Looking beyond methods and logistics, long-term research also faces the challenge of gathering data over a long period during which people, society, and education change. It may be that certain types of EE are more amenable to long-term evaluation. Understanding how nature study, which has been a cornerstone of our field for nearly a century, influenced participants 40 years ago offers insight into the impacts of similar programs today. In contrast, decades-long studies of EE that focuses on environmental issues that change over time, such as point source and non-point source pollution, may be less feasible and relevant. EE evolves and thus long-term studies should carefully balance the need for extended duration and continued relevance.

CONCLUSION

Environmental educators speak of “planting a seed” in the hope that environmental behaviors will emerge later on. However, given the potentially long timeframe between when an individual participates in a program and demonstrates environmental behaviors, during which participants experience many intervening factors, documenting any changes in attitudes and behaviors through objective before and years after program measures presents numerous challenges. On the other hand, limiting ourselves to documenting immediate post-program impacts risks the potential of missing out on behaviors that are only expressed years later, as a

result of supportive social and political structures, social norms that differ with age cohort, cumulative experiences, and other factors. For this reason, the sub-field of long-term EE research merits further examination.

Significant life events research focusing on environmentally active individuals and on the general public has revealed the importance of time spent in nature, within or outside of formal EE programs, in influencing later involvement in environmental recreation, activism, and choice of profession, as well as positive attitudes toward nature. Retrospective studies also have demonstrated the importance of repeated exposure to EE and other outdoor activities in influencing subsequent knowledge, attitudes, and behaviors, and memory studies have begun to suggest particular program elements that may be connected to content retention and lasting impacts. However, long-term research overall suffers from lack of a consistent theory, and in some empirical work, from inattention to any theoretical frameworks. This research also suffers threats to internal and external validity related to biased samples and intervening variables. Although not specifically addressed in this chapter, long-term research, similar to other types of environmental research, also suffers from lack of agreed-upon outcomes. For example, in the retrospective evaluation research conducted by the authors of this chapter, programs varied from a focus on teaching natural history and science knowledge to promoting future outdoor recreation. While the programmatic focus did influence what participants recall, other aspects such as social interactions and opportunities for personal growth, were emerged as memorable and influential (Liddicoat, 2012). The diversity of goals found across our three research sites are but a small sample of the diversity of goals stated by EE programs around the world, which may be an impediment to moving forward in documenting EE's impacts beyond those specific to a

particular program. This lack of ability to consistently document EE outcomes may in turn prove a barrier to garnering political and public support for EE.

As the field of EE moves forward, researchers may want to work with practitioners to define program goals that reflect research on significant life events and long-term impacts of EE programs. For example, if studies continue to suggest, as do the SLE studies and Ewert et al. 2005, that *time spent in nature*, especially with environmental organizations and with environmentally active friends, may be more important in influencing subsequent stewardship behaviors than *formal EE*, the design and location of EE programs may need to change. As the sub-field of long-term studies evolves, researchers may want to consider combining the approaches reviewed in this chapter to further both practice and theory. When time and logistics allow, true longitudinal studies with pre-, post-, and follow-up data involving both objective measures and qualitative self-report may be particularly informative. One exemplary study of this sort was conducted by Gass, Garvey, and Sugerman (2003) on the impacts of freshman orientation programs. Students were observed during the program, interviewed directly after it, and interviewed again 17 years later, thus allowing the researchers to answer questions related to short and long-term impacts. A longitudinal study focused on memory with interviews at intervals over an extended period also could provide insight into how memories change over time and how they are linked to program impacts. Future studies may also combine SLE and memory approaches. In our own research attempting to link memory and outcomes of EE programs, we chose not to ask about influential experiences other than specific elements of the EE programs. However, adding information that would allow us to compare memories of an EE experience with other memories, and to examine how respondents link various memories to

behaviors, would create a more complete understanding of the impacts of EE programs and specific program elements.

REFERENCES

- Arnold, H. E., Cohen, F. G., & Warner, A. (2009). Youth and environmental action: Perspectives of young environmental leaders on their formative influences. *Journal of Environmental Education, 40*(3), 27-36.
- Baddeley, A. (2001). The concept of episodic memory. *Philosophical Transactions: Biological Science, 356*(1413), 1345-1350.
- Ballard, A., Shellman, A., & Hayashi, A. (2006). Collective meanings of an outdoor leadership program experience as lived by participants. *Research in Outdoor Education, 8*, 1-21.
- Bluck, S. (2003). Autobiographical memory: Exploring its functions in everyday life. *Memory, 11*(2), 113-123. doi:10.1080/741938206
- Bogner, F. X. (1998). The influence of outdoor ecology education on long-term variables of environmental perspective. *Journal of Environmental Education, 29*(4), 17-29.
- Chawla, L. (1998a). Research methods to investigate significant life experiences: review and recommendations. *Environmental Education Research, 4*(4), 383-397.
- Chawla, L. (1998b). Significant life experiences revisited: A review of research on sources of environmental sensitivity. *Environmental Education Research, 4*(4), 369-382.
- Chawla, L. (1999). Life paths into effective environmental action. *Journal of Environmental Education, 31*(1), 15-26.

- Chawla, L. (2007). Childhood experiences associated with care of the natural world: A theoretical framework for empirical results. *Children, Youth and Environments*, 17(4), 144-170. Retrieved from <http://www.colorado.edu/journals/cye>
- Christianson, S.-A., & Safer, M. A. (1996). Emotional events and emotions in autobiographical memories. In D. C. Rubin (Ed.), *Remembering our past: Studies in autobiographical memory* (pp. 218-243). Cambridge, UK: Cambridge University Press.
- Corcoran, P. B. (1999). Formative influences in the lives of environmental educators in the United States. *Environmental Education Research*, 5(2), 207-220.
- D'Amato, L. G., & Krasny, M. E. (2011). Outdoor adventure education: Applying transformative learning theory to understanding instrumental learning and personal growth in environmental education. *Journal of Environmental Education*, 42(4), 237-254.
- Daniel, B. (2007). The life significance of a spiritually oriented, Outward Bound-type wilderness expedition. *Journal of Experiential Education*, 29(3), 386-389.
- Dillon, J., Kelsey, E., & Duque-Aristizabal, A. M. (1999). Identity and culture: Theorising emergent environmentalism. *Environmental Education Research*, 5(4), 395-405.
- Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). Measuring endorsement of the New Ecological Paradigm: A revised NEP scale. *Journal of Social Issues*, 56(3), 425-442.
- Everson, M. (2000). *A long-term retrospective study of participants' perception about the influence of Teton Science School's flagship programs on environmental and recreational behaviors*. Unpublished masters thesis, Utah State University, Logan, UT.

- Ewert, A., Place, G., & Sibthorp, J. (2005). Early-life outdoor experiences and an individual's environmental attitudes. *Leisure Sciences, 27*, 225-239.
doi:10.1080/01490400590930853
- Farmer, J., Knapp, D., & Benton, G. M. (2007). An elementary school environmental education field trip: long-term effects on ecological and environmental knowledge and attitude development. *Journal of Environmental Education, 38*(3), 33-42.
- Furihata, S., Ishizaka, T., Hatakeyama, M., Hitsumoto, M., & Ito, S. (2007). Potentials and challenges of research on 'Significant Life Experiences' in Japan. *Children, Youth and Environments, 17*(4), 207-226. Retrieved from <http://www.colorado.edu/journals/cye>
- Gass, M. A., Garvey, D. E., & Sugerman, D. A. (2003). The long-term effects of a first-year student wilderness orientation program. *The Journal of Experiential Education, 26*(1), 34-40.
- Gassner, M., Kahlid, A., & Russell, K. (2006). Investigating the long-term impact of adventure education: A retrospective study of Outward Bound Singapore's classic 21-day challenge course. *Research in Outdoor Education, 8*, 75-93.
- Gough, A. (1999). Kids don't like wearing the same jeans as their mums and dads: So whose 'life' should be in significant life experiences research? *Environmental Education Research, 5*(4), 383-393.
- Gough, N. (1999). Surpassing our own histories: Autobiographical methods for environmental education. *Environmental Education Research, 5*(4), 407-418.
- Hanson, R. (1993). Long term effects of the energy source education program. *Studies in Educational Evaluation, 19*, 363-381.

- Herbert, D. M. B., & Burt, J. S. (2004). What do students remember? Episodic memory and the development of schematization. *Applied Cognitive Psychology, 18*, 77-88.
doi:10.1002/acp.947
- Hsu, S.-J. (2009). Significant life experiences affect environmental action: a confirmation study in eastern Taiwan. *Environmental Education Research, 15*(4), 497-517.
doi:10.1080/13504620903076973
- Hudson, J. A., & Fivush, R. (1991). As time goes by: Sixth graders remember a kindergarten experience. *Applied Cognitive Psychology, 5*, 347-360.
- James, J. J., Bixler, R. D., & Vadala, C. (2010). From play in nature, to recreation then vocation: A developmental model for natural history-oriented environmental professionals. *Children, Youth and Environments, 20*(1), 231-256. Retrieved from <http://www.colorado.edu/journals/cye>
- Kellert, S. R. (1998). *A national study of outdoor wilderness experience*. New Haven, CT: Yale School of Forestry and Environmental Studies and the Student Conservation Association.
- Kerlinger, F. N., & Lee, H. B. (2000). *Foundations of behavioral research* (4th ed.). Orlando, FL: Harcourt College Publishers.
- Knapp, D., & Benton, G. M. (2005). Long-term recollections of an environmental interpretive program. *Journal of Interpretation Research, 10*(1), 52-54.
- Knapp, D., & Benton, G. M. (2006). Episodic and semantic memories of a residential environmental education program. *Environmental Education Research, 12*(2), 165-177.
doi:10.1080/13504620600688906
- Liddicoat, K. (2012). *Memories and lasting impacts of residential outdoor environmental education programs*. Unpublished doctoral dissertation, Cornell University, Ithaca, NY.

- Linton, M. (1982). Transformations of memory in everyday life. In U. Neisser (Ed.), *Memory observed: Remembering in natural contexts* (pp. 77-91). New York: W. H. Freeman.
- Lohr, V. I., & Pearson-Mims, C. H. (2005). Children's active and passive interactions with plants influence their attitudes and actions toward trees and gardening as adults. *HortTechnology*, 15(3), 472-476.
- Palmer, J. A., & Suggate, J. (1996). Influences and experiences affecting pro-environmental behavior of educators. *Environmental Education Research*, 2(1), 109-121.
- Palmer, J. A., Suggate, J., Bajd, B., Hart, P., Ho, R. K. P., Ofwono-Orecho, J. K. W., et al. (1998). An overview of significant life influences and formative experiences on the development of adults' environmental awareness in nine countries. *Environmental Education Research*, 4(4), 445-465.
- Palmer, J. A., Suggate, J., Bajd, B., & Tsaliki, E. (1998). Significant influences on the development of adults' environmental awareness in the UK, Slovenia, and Greece. *Environmental Education Research*, 4(4), 429-444.
- Palmer, J. A., Suggate, J., Robottom, I., & Hart, P. (1999). Significant life experiences and formative influences on the development of adults' environmental awareness in the UK, Australia, and Canada. *Environmental Education Research*, 5(2), 181-200.
- Peacock, A. (2006). Changing minds: The lasting impact of school trips. Retrieved from http://www.nationaltrust.org.uk/main/w-schools-guardianships-changing_minds.pdf
- Pillemer, D. B. (1998). *Momentous events, vivid memories*. Cambridge, MA: Harvard University Press.
- Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Boston: Houghton Mifflin.

- Sivek, D. J. (2002). Environmental sensitivity among Wisconsin high school students. *Environmental Education Research, 8*(2), 155-170. doi:10.1080/1350462022012822 0
- Smith-Sebasto, N. J., & Oberchain, V. L. (2009). Students' perceptions of the residential environmental education program at the New Jersey School of Conservation. *Journal of Environmental Education, 40*(2), 50-62.
- Sward, L. L. (1999). Significant life experiences affecting the environmental sensitivity of El Salvadoran environmental professionals. *Environmental Education Research, 5*(2), 201-206.
- Tanner, T. (1980). Significant life experiences: A new research area in environmental education. *Journal of Environmental Education, 11*(4), 20-24.
- Tanner, T. (1998). Choosing the right subjects in significant life experiences research. *Environmental Education Research, 4*(4), 399-417.
- Thompson, C. P., Herrmann, D. J., Bruce, D., Read, J. D., Payne, D. G., & Toglia, M. P. (1998). *Autobiographical memory: Theoretical and applied perspectives*. Mahwah, NJ: Lawrence Earlbaum Associates.
- Thompson, C. P., Skowronski, J. J., Larsen, S. F., & Betz, A. L. (1996). *Autobiographical memory: Remembering what and remembering when*. Mahwah, NJ: Lawrence Earlbaum Associates.
- Thompson, C. W., Aspinall, P., & Montarzino, A. (2008). The childhood factor: Adult visits to green places and the significance of childhood experience. *Environment and Behavior, 40*(1), 111-143. doi:10.1177/0013916507300119

Wells, N.M., & Lekies, K.S. (2006). Nature and the life course: Pathways from childhood nature experiences to adult environmentalism. *Children, Youth and Environments*, 16(1), 1-24.

Retrieved from www.colorado.edu/journals/cye/

Zimmer, H. D., Cohen, R. L., Guynn, M. J., Englecamp, J., Kormi-Nouri, R., & Foley, M. A. (Eds.). (2001). *Memory for action: A distinct form of episodic memory?* New York: Oxford University Press.

CHAPTER 3

MEMORIES FROM 47 YEARS OF OUTDOOR EDUCATION EXPERIENCES

ABSTRACT

Many of environmental education's goals relate to lifelong interest in and care for the natural environment. This study capitalized on the nearly 50-year association between a residential outdoor environmental education (ROEE) center and a relatively stable community to gather data from adults about their childhood experiences. Qualitative interviews with 45 individuals who attended the program between 1958 and 1992 explored what participants remember from a ROEE program years later. Experiences that were active, offered opportunities for achievement and emotional engagement, involved social interactions, and were both distinctive and applicable at home were found to be particularly memorable. These findings are supported by psychological research on episodic memories and provide insight into how current educators can create long-lasting memories through their programs.

INTRODUCTION

I'm awed how...for a 2-day span of time, I probably have an awful lot of memories that occurred such a long time ago...You know, looking back on it, there were a lot of things I did in school that I don't remember any better than that" (male participant, 1961).

Outdoor environmental education programs for children are often short, just a few *hours* or *days* in the midst of years of classroom-based education (Ballatyne & Packer, 2006); yet outdoor educators' goal is to inspire *life-long* environmental stewardship and interest in the natural world. Evaluative research documenting the lasting impact of environmental education is limited, in part due to logistical and methodological challenges (Carleton-Hug & Hug, 2010). However, as the fields of outdoor and environmental education have matured, so too have the

children who participated in such programs over the past decades. Hammerman (1980) documents over 50 years of residential outdoor education in the United States, and the North American Association for Environmental Education (NAAEE) celebrated its 40th anniversary in 2011 (Carter & Simmons, 2010). Long-standing programs and the communities that participated in them can now offer insights into the lasting impacts of a youth outdoor education program. Memories of the experience serve as one indicator of what was learned, has been retained, and can continue to be used throughout one's life (Knapp & Benton, 2006). Retrospective studies can do more than document the past, though; by understanding why certain aspects of previous programs were memorable, educators can design new programs based on today's environmental issues that will create lasting memories and, possibly, the desired life-long impacts.

Focusing specifically on residential outdoor environmental education (ROEE), our study looks at an exemplary program with a consistent curriculum sponsored by a relatively stable community for over 50 years, exploring what past participants remember from their experience and why. ROEE programs, in which elementary or middle school students spend up to a week living and learning at an environmental education (EE) center, typically include hands-on exploration of the natural world and scientific principles, environmental awareness and stewardship activities, and outdoor recreation (Stern, Powell, & Ardoin, 2008). Such programs are common in the United States (Liddicoat, Rogers, and Anderson, 2006) and exist in Europe and Australia (Ballantyne & Packer, 2006; Bogner, 1998, 2002), among other places. Our study provides a uniquely long-term perspective on their instructional techniques and outcomes.

LITERATURE REVIEW

Environmental Education Research

Recent enthusiasm for initiatives to increase the quality and quantity of time children spend in the outdoors for physical, psychological, social, or environmental reasons is based on multiple areas of research. The Significant Life Experiences literature demonstrated through interviews, surveys, and essays that current environmentalists and environmental educators in many countries credit childhood experiences in nature, often with other people, as influential in guiding their current environmental views and efforts (Chawla, 1999; Corcoran, 1999, Furihata, Ishizaka, Hatakeyama, Hitsumoto, & Ito, 2007; Palmer et al., 1998a; Palmer, Suggate, Bajd, & Tsaliki, 1998; Palmer, Suggate, Robottom, & Hart, 1999; Tanner, 1980). Other studies with the general public have also shown a correlation between certain types of outdoor experience in childhood and pro-environmental attitudes and behaviors in adulthood (Ewert, Place, & Sibthorp, 2005; Wells & Lekies, 2006). Research on youth has also shown that spending time in nature promotes healthy physical, intellectual, social, and emotional development (reviewed in Louv, 2005 and Godbey, 2009), and Kellert (2002, 2005) has proposed child development stages related to the connection with the natural environment. Together these studies of adults and youth provide valuable justification for outdoor education and recreation programs; yet their focus on outcomes rather than process means that they offer educators few specifics on how to create experiences that will have the desired lasting, positive impacts on youth today. By exploring which characteristics of outdoor education experiences lead to long-term memories, our research begins to fill this knowledge gap.

Much of the research on ROEE has focused primarily on immediate changes in participants' knowledge, attitudes, and behaviors as a result of the program. Researchers in

Europe (Bogner 1998, 2002; Bogner & Wiseman, 2004) and the United States (Johnson & Manoli, 2008, 2011) have developed and validated an instrument measuring change in views on utilization and preservation of nature for use with elementary and middle school participants in ROEE programs. In two large studies (N= 729 and N=1367, respectively) of fourth-sixth grade participants in Earth Education (ROEE) programs, Johnson and Manoli (2008, 2011) found significant increases in preservation attitudes and decreases in utilization attitudes toward nature. Bogner (1998, 2002) documented similar changes, along with increases in knowledge, immediately post-program, and in one case, again six months later (Bogner, 1998). Using a different instrument, Stern, Powell, and Ardoin (2008) found that three- and five-day ROEE programs resulted in increased connection with nature, stewardship intentions and actions, interest in learning and discovery, and awareness of the local ecology and biodiversity, in fourth-seventh grade participants (N=183). This study also looked at structural factors and found that longer programs and teacher involvement led to significantly greater changes in some outcomes, while group size did not have a significant impact. Gains in two of the four areas studied, stewardship and awareness of biodiversity, were retained three months after the program.

Earlier studies reviewed by Leeming, Dwyer, Porter, and Cobern (1993), Zelezny (1999), and Gralton, Sinclair, and Purnell (2004) reported more mixed results. Additionally, Smith-Sebasto and Semrau (2004) found that a ROEE experience for sixth graders significantly improved problem-solving skills and attitudes toward conservation but not nature appreciation, views on recycling and pollution, or environmental science knowledge, despite educational components of the experience related to these goals. More recently, Smith-Sebasto and Cavern (2006) found that unless students experienced both pre- and post-trip programs at school, the ROEE experience did not have an impact on students' environmental attitudes.

Taken together, the studies reported above demonstrate that ROEE has the potential to change environmental attitudes and behavioral intentions, although it does not do so in all cases. What is less clear is whether these changes are maintained over time.

Memory Research

One approach to measuring lasting outcomes of programs is to document memories of the educational experiences. By focusing on memories, which are inherently tied to the event that created them, researchers are able overcome some of the threats to interval validity introduced by uncontrolled intervening variables (Knapp & Benton, 2006). Memories are also valuable data because, as Semb and Ellis (1994) explain in relation to formal education,

The very existence of school rests on the assumption that people learn something of what is taught and later remember some part of it. This knowledge is often a prerequisite for knowing when and how to perform jobs and tasks in the real world, for making educated choices as consumers and citizens, or for taking advanced schooling. Thus, it is important to know not only if students remember but how much and what kind of knowledge is remembered. (pp. 253-254)

Building on prior studies in formal education and museum education, Knapp and colleagues have conducted extensive research on memories of interpretive programs. Knapp and Benton (2005) interviewed six adults two years after an interpretive program on deer and found that participants recalled aspects that were visual, active, novel, and related to the interpreter. Interviews with more participants (N=36) six months after a historical interpretive program revealed that they recalled specific information learned, positive emotions, ranger attributes, and aspects of the program connected to their personal experiences (Knapp, 2006). Evaluating a program more similar to the one we studied, Knapp and Benton (2006) observed a five-day Expedition Yellowstone! ROEE program for fifth graders and then contacted ten participants by phone one year later. Students were able to relate specific information about games they played

and to describe aspects of program content, as well as talk about the positive and negative emotional aspects of the trip. Additionally, Farmer, Knapp, and Benton (2007) found that one year after a day-trip to Great Smoky Mountains National Park, fourth-graders were able to recall the active components of the trip and discuss related environmental knowledge and pro-environmental views. Based on these and numerous other studies, Knapp (2007) recommends that (among other things) interpreters learn about visitors, relate their program to participants' lives, take advantage of their park's unique features, provide hands-on experiences and integrate instructional material into those activities, and recognize that interpretive programs are short episodic events that should have narrow, specific goals.

Knapp's research, as well as our own, focuses on long-term declarative (explicit) memories, that is, on information and events people consciously recall months and years later. Psychologists have divided such memories into two types:

1. *Episodic*, memories of events and knowledge that is still consciously tied to those events
2. *Semantic*, generalized knowledge no longer tied to the situation(s) in which it was learned (Baddeley, Eysenck, & Anderson, 2009).

Tulving (1983) originally proposed this distinction, and it has been supported, refined and expanded by numerous subsequent studies (Baddeley et al., 2009). Because episodic memories are by definition still tied to the event that created them, such memories of a ROEE experience can provide insight into what program participants not only learn but also retain from the program (Knapp & Benton, 2006).

Memory researchers have found that certain types of events yield more detailed, more enduring, and sometimes more accurate episodic memories. Engelkamp (2001) and Zimmer et al. (2001) have found that physically performing tasks yields stronger memories than either

observing others perform the tasks or verbally learning about such actions, although whether these stronger memories are due to motor performance, self involvement, or action planning is still under investigation (Zimmer et al, 2001). Dijkstra and Misirlisoy (2006) note that experiences generally involve an activity (what), a time (when), other people (who), and a place (where). In a study involving recall of a previously described event , they found that the activity component was remembered most frequently, followed by other people involved, suggesting that activity components are dominant in the organization and retrieval of episodic memories.

Much research has examined the relationship between emotion and episodic memory. Diary studies have demonstrated that emotional events are more memorable than neutral events, and positive events are more memorable than negative events. Lindsay, Wade, Hunter, and Read (2004) asked college students and adults to indicate which activities from a list of common childhood activities they knew they had done as children and which they actually remembered. Emotional experiences were remembered more frequently, as were more positive events. The data revealed that older study participants remembered fewer childhood experiences than younger participants. In a laboratory study, Schmidt, Patnaik, and Kensinger (2011) also found that images resulting in positive emotional arousal were the most memorable. Neuroscience is beginning to document differences in the encoding processes for arousing and neutral events (Welzer & Markowitsch, 2005), although as Levine and Pizarro (2004) note, arousal is only one aspect of experiencing positive or negative emotion.

Distinctiveness and importance of an event can also enhance episodic memory. Herbert and Burt (2004) found that college students who studied information rich in distinctive features possessed stronger episodic memories of the material two days later and greater related knowledge (semantic memories) five weeks later than their classmates who studied material

lacking distinctive features. Linton (1982) kept a daily diary of her own life events for six years testing recall of randomly selected events from the entire study period every month. She observed that distinctive events or first times were retained as episodic memories, while memories of repetitive events lost their specificity and became semantic memory. Emotional events considered salient at the time, as well as in the context of subsequent life experiences, were also remembered. Catal and Fitzgerald (2004) also explored the role of distinctiveness and importance in episodic memory through a diary study of 20 years. Their two participants not only recorded daily events but also ranked each in terms of distinctiveness and importance. Subsequent memory tests demonstrated that more distinctive and more important events were more memorable.

In sum, studies in laboratory and natural settings have demonstrated that events that are active, distinctive, personally important, and arouse positive emotions, yield particularly strong and long-lasting episodic memories.

RESEARCH QUESTION

What do people recall years later from a ROEE experience, and why were those components of the program particularly memorable?

METHODS

Methodology

Qualitative methods have been described as “study[ing] things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meaning people bring to them” (Denzin & Lincoln, 2005, p. 3). Similarly, Merriam (2009) states that “the overall

purposes of qualitative research are to achieve an *understanding* of how people make sense out of their lives, delineate the process (rather than the outcome or the product) of meaning-making, and describe how people interpret what they experience” (p.14). In keeping with this approach to research, our study explored what individuals experienced during a ROEE program and the process by which memories of this experience were created and stored. Qualitative methods were appropriate for this project for other reasons as well. Limited prior research on memories and their uses in EE necessitated an exploratory, inductive approach to data collection and analysis (Merriam, 2009). The size and bounded nature of the programs called for gathering detailed, site-specific information from a small sample of individuals (Lodico, Spaulding, & Voegtler, 2010). Qualitative methods were also particularly appropriate due to the retrospective nature of this study in which participants were reflecting on an experience in natural (not laboratory) settings. Because such reflection, or reminiscing, is often a social activity, interviews were a logical and evocative way to gather memories (Kihlstrom, 2009), and enabled participants to describe remembered experiences and examine their meaning and impact through self-reflection and conversation (Holstein & Gubrium, 1999).

The research presented in this paper is one piece of a larger grounded-theory study of episodic memories of ROEE and their use in post-EE programs. A grounded theory is one that is “derived from data, systematically gathered and analyzed through the research process” (Strauss & Corbin, 1998, p. 12). The researcher generally begins the research process by selecting a problem to investigate based on the published literature or professional experience, chooses a research method, and then allows themes that emerge from the data to direct additional literature review, data collection, data analysis, and eventually theory formulation (Strauss & Corbin, 1998). Once initial themes and theories have been formulated, confirmatory data are collected to

expand, verify, and/or alter the proposed theory. Related theories can be brought in at this point as well (Auerbach & Silverstein, 2003). We used data-analysis procedures such as coding and constant comparison, which are rooted in grounded-theory methodology, but are now used more widely in applied social science research (Merriam, 2009), to identify emergent themes and then connect them with prior research and theory.

Site Description and Data Collection Procedures

Our research site, Bradford Woods, has a long history as a leader in outdoor education (Smith, Carlson, Donaldson, & Masters, 1963) and an extended relationship with the Metropolitan School District of Martinsville (MSDM) in central Indiana. Bradford Woods is a 2,500 acre nature preserve owned by Indiana University and located about 15 miles from the center of Martinsville. The MSDM, which includes nine rural and town elementary schools, began sending all of its fifth graders to Bradford Woods for day programs in 1958 and for residential programs in 1961. Students stayed at Bradford Woods for two nights, sleeping in platform tents and eating in a dining hall, and were taught by their own teachers and science teachers from Martinsville High School.

Interview Guide Development

The semi-structured interviews conducted for this research were a cross between two methods: a standardized open-ended interview in which questions are developed prior to the interview and asked as written, and an interview following an interview guide in which topics are listed ahead of time and discussed in an order and wording that follows the flow of the conversation (Henderson & Bialeschki, 2010). As can be seen in Appendix A, the interviews

consisted of three main parts: memories, perceived impacts, and current attitudes and behaviors. Questions and discussion topics were kept in their appropriate sections during the interviews, but were sometimes re-arranged and re-worded to fit the conversation, particularly if one memory led logically to another or if an aspect of the program had already been described in detail in answer to a previous question. Within the memories section, I always asked general questions first and specific questions second, in order to gather un-cued memories before providing prompts for cued memories (Baddeley, Eysenck, & Anderson, 2009). Data from the third section of the interviews, current attitudes and behaviors are not presented in this article.

The interview guide was based on knowledge of the program, memory literature, and prior studies in EE. Neither MSDM nor the elementary schools nor Bradford Woods had any historical documents regarding Martinsville's outdoor education program, so I began by interviewing seven former teachers and program directors who (collectively) had experience with the program between 1956 and the present. These individuals helped me understand what the students had experienced and what they might remember. I also discussed my interview guide with a researcher familiar with retrospective studies and compared my questions with those he had used in previous studies (Knapp, personal communication). The interview guide was piloted in three interviews with current Bradford Woods staff who attended the program as children and reside in the local community.

Sampling and Data Collection

Data were collected through interviews with 45 adults who attended the program as fifth graders between 1958 and 1992. Because Martinsville is a relatively stable community (U. S. Bureau of the Census, 1990, 2000) and because Bradford Woods lacks a list of alumni, I used a

snowball sampling method (Patton, 2002) to recruit interviewees that still live in the local area. Approximately half of the interviewees were located through advertisements in the newspaper and on the radio, signs posted in stores, sign-up tables at local events, and an email sent by the Martinsville Chamber of Commerce to member businesses. At the conclusion of each interview, I asked the participant to recommend additional interviewees. The remaining half of my sample was recruited by calling these recommended individuals to schedule interviews. Only a very few individuals whom I called declined to be interviewed, usually due to time constraints. The study sample was intentionally distributed across the decades, but grouped at the beginning of each decade for cohort comparison and included former students from all Martinsville elementary schools. I included individuals with varied levels of education (although all graduated from high school), from different economic and social groups, and currently working in diverse professions. I was more successful in recruiting women (n=32) than men (n=13) to be interviewed, which may have biased my results. All interviewees were Caucasian, and most had spent the majority of their life in central Indiana. See Table 1 for additional demographic information.

Interviews lasted 15-30 minutes, and all but three were conducted one-on-one. Interviewees were given a Bradford Woods hat as compensation at the beginning of the interview. The location of the interview was selected by the interviewee and locations included coffee shops, schools, offices, the public library, and interviewee homes. All interviews were digitally recorded and subsequently transcribed by the researcher.

Table 1. Study participant demographics. Numbers in parentheses indicate the number of participants in each category.

Gender	Year Attended Bradford Woods	Elementary School Attended	Current Profession
Female (32)	1959 (1)	<u>Rural School (12 total)</u>	Business (3)
Male (13)	1960 (2)	Brooklyn (2)	College Student (2)
	1961 (2)	Centerton (3)	Customer Service (6)
	1962 (3)	Green (2)	Facility and Lawn Care (4)
	1963 (1)	Paragon (5)	Finance and Insurance (5)
	1965 (1)		Health Care and Medicine (4)
	1968 (2)	<u>Town School (33 total)</u>	Mother (3)
	1969 (2)	Central (4)	Pre-K-12 Education (9)
	1970 (2)	North (6)	Secretary (2)
	1971 (3)	Poston Road (6)	Miscellaneous (4)
	1972 (4)	Smith/East (15)	
	1973 (1)	South (2)	
	1978 (1)		
	1979 (2)		
	1980 (3)		
	1981 (1)		
	1982 (3)		
	1989 (2)		
	1990 (3)		
	1992 (6)		

Data Analysis

Data were analyzed inductively by the first author, who also conducted and transcribed the interviews. Data analysis occurred in two stages. The first round of coding consisted primarily of open coding (Strauss & Corbin, 1998; Charmaz, 2006) and resulted in nearly 100 codes that emerged directly from the data, including structural, descriptive, process, and emotion codes (Saldana, 2009). Most codes were focused on activities and experiences specific to the program such as panning for gold, sleeping in tents, or earning rainbow trail ribbons. I also continued to review the literature on memory and long-term impacts of EE during this initial stage of data analysis. Results from this first analysis were summarized in a report for Bradford Woods and discussed with community members, current Bradford Woods and MSDM staff, and

leaders of other ROEE centers. The emphasis was on applied findings. In order to more fully explore the research questions discussed in this current paper—what do past participants remember and what are the characteristics of those memorable experiences—the data on memories and perceived impacts were re-read and re-coded. While most codes still emerged from the data and were descriptive and process oriented (Saldana, 2009), their development and assignment was influenced by the memory literature discussed above. Codes (and their related coded texts) were then grouped in to themes, many by type of experience. For example, panning for gold and learning natural history through the rainbow trail program were considered related because the students were receiving formal instruction from teachers, actively engaging with their natural surroundings, and described being motivated by the potential rewards earning ribbons or finding gold. Some themes, such as novelty and application at home, cut across specific aspects of the program and allowed for analysis more focused on the interaction between the participant and the experience. The process of developing themes was informed by Merriam's (2009) recommendation that themes "be responsive to...the research question(s) and...sensitive to the data,...exhaustive,...mutually exclusive,...[and] conceptually congruent" (p. 186). Codes and themes developed through this second round of analysis were compared to those developed during the initial round of analysis to confirm that major ideas or topics had not been overlooked. The literature reviewed between analyses and conversations with teachers and program participants were also considered.

RESULTS

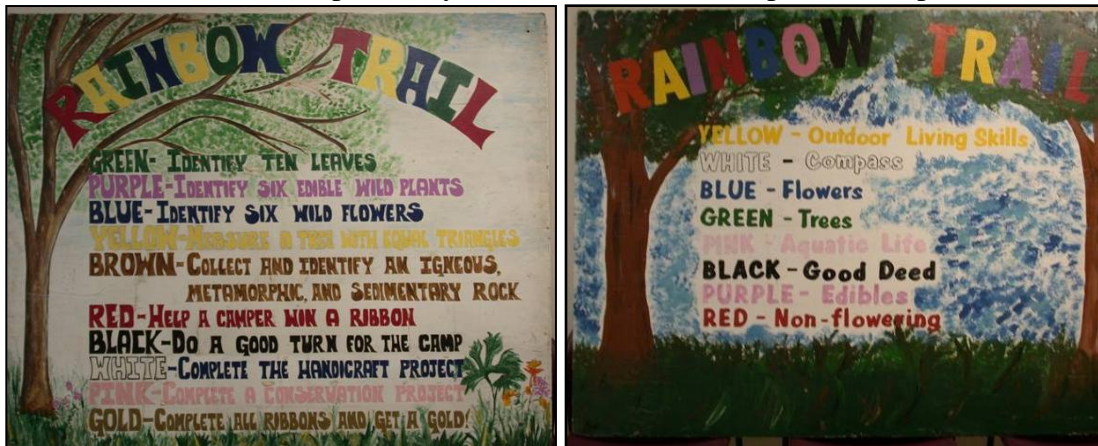
Results are reported below by theme with quotes from participants integrated into the text or displayed in figures. The themes that emerged from our data were learning natural history

with an incentive, experiencing history through active programming, engaging emotionally through the challenge of staying away from home and through opportunities for achievement, experiencing nature and nature study, and learning through interactions with teachers and peers. We also explore the role of novelty and applicability in making this ROEE experience particularly memorable. Memories of Bradford Woods and reflections on the experience were not noticeably different across the time period studied except with regard to specific program components and leaders that changed over time.

Learning Through Instruction

The curriculum of the Bradford Woods ROEE program remained remarkably consistent between the early 1960s and the late 1990s. At the center was the Rainbow Trail program in which students earned pieces of colored yarn for demonstrating knowledge of natural history and living well with their peers (see Illustration 1). The specific components changed over time, but the importance of earning all the yarns and displaying them proudly on a piece of felt pinned to one's shirt did not.

Illustration 1. Two posters showing the components of the Rainbow Trail program through the decades. The color of the piece of yarn earned for each component completed is indicated.



The other main instructional focus was local history. Up until the late 1980's students experienced history first hand by panning for gold in a creek. Many students also had the opportunity to visit historic buildings on the property and hear stories about the Bradford brothers and their mining operation.

Memories of the Rainbow Trail program and panning for gold are presented below. The data provide evidence of learning and retention as well as insight into why these program components were engaging and memorable.

Identifying Plants: Active Learning with a Reward

The Rainbow Trail curriculum was particularly effective in inspiring learning for a variety of reasons. It was active, requiring students to hike through the woods identifying different trees and flowers. Other components of the Rainbow Trail included identifying rocks, studying aquatic life, and measuring the height of a tree. Knowledge of the local flora was retained for years; in the interviews participants spontaneously mentioned a total of ten species that they learned at Bradford Woods and can still identify based on their experience (see Figure 1 for a sample of participants' comments).

Figure 1. Evidence of natural history learning and retention. Participants were required to be able to identify ten trees, six flowers, and six edibles, and different species stood out for different people.

Identifying some of the things that we had learned about [in school]. You know, trillium, and I think one thing that stands out was, I think they called it the Indian Toothbrush. You know that reed kind of thing....Every time I see it, it's like, I know exactly what that is. (1960, female)

One of the hikes ... I remember that [the teachers] bent over and they broke a weed off and they pulled it apart and they said this is what the Indians brushed their teeth with. (1968, male)

I loved doing the tree identification. And the other thing is we painted our faces with one of the roots called bloodroot. (1972, female)

We did do the tree study where we had to learn each tree. Like we learned sycamore because it you know looks sick as it goes up. We learned the maple. (1992, female)

And I remember a tulip tree that was there. They talked about how straight and perfect it was, no limbs up to a certain point. I had never looked at a tree from the stand point of what it was worth rather than its beauty, you know. So that was kind of interesting. (1961, male)

Mainly it was about the different types of bark, which I had never looked at the bark of the tree really. I had always just looked at leaves, and it didn't ever occur to me that different trees have different bark--other than sycamores and the white colored trees. (1972, female)

I don't know whether it really changed me as a person, anything like that, but I did know more about, a little more about, nature. You know like now, like with the oak trees, like the red oak and the white oak, the red is pointed leaves...and the white is the rounded leaves... And then the dogwood tree...so I think maybe just having more of an awareness about nature. (1972, female)

Yeah, there were a couple of berries I remember that they would show...you can eat this or you cannot eat that. Also some of the sassafras they showed us how you could possibly eat that. Some things also that you should stay away from. (1979, male)

And we had to find like certain plants and trees and identify them by their leaves and stuff and still to this day, I see May Apples, and I'm like, oh, that's a May Apple, because of that fifth-grade trip. Because we had a test on it or something. We had to go and look at trees and look at the leaves and certain plants and stuff like that. I do remember that. (1992, female)

The Rainbow Trail system of earning yarns (also called ribbons) for demonstrating knowledge provided clear expectations from teachers, an incentive to learn, and the opportunity to accomplish a personal goal, as the following remarks indicate:.

It was a felt piece of cloth. It was cut out, and you tied a yarn string of each color [on it] for everything you learned. Like the one was for the leaves on the trees. One was for cooperation amongst your group....They all stood for something different. I had the whole thing filled up, and I know I have it somewhere. (1968, female)

If you did so many projects they gave you a color of yarn that you tied on that little badge....I assume I got most of them because I remember that kind of being a badge of honor that you could wear. And kids were so proud of them. (1962, male)

Friendly competition between students encouraged learning as well as cooperation. As whole families and, later, multiple generations went through the program, the rainbow badge became a recognized symbol of achievement in the community:

I remember I wanted that so badly because I had three older brothers and they each had one... I know [I still have it] somewhere because that was one of the cool parts of going to Bradford Woods. (1981, female)

I was like, how many [ribbons] did *you* get, and how many did *you* get? We all wanted to learn everything...you know, fifth grade, you just want to get everything you possibly can. [It was] kind of competitive maybe. (1992, female)

But there's one thing that I'll always remember...there was one boy that was in my class and he had kind of a hard time... getting his ribbons. Everybody had theirs except for him, and we all worked so hard to help him. He got them all, and when he got on the bus, everybody was cheering for him. So that was really neat. (1972, female)

Panning for Gold: Experiencing History

Panning for gold was remembered by nearly all the interviewees who attended Bradford Woods prior to 1990. Multiple aspects of panning for gold made it engaging and meaningful. It was active and fun with kids getting to play in the creek. It was an opportunity to re-live an exciting aspect of local history and was fueled by the expectation that one might indeed find a speck of gold. These three motivating factors intertwined to create excitement at the time and vivid, lasting memories, as expressed by these participants:

Jumping in the creek, getting my feet all wet, I remember that. Panning for gold. I thought for sure we was going to find gold, you know being young... We was all going to get rich and take it home to mom. (1960, female)

Well the first thing is panning for gold. I loved it. I loved it. It was just a nice day. It was fun to be down in the creek. I think somebody found some gold flakes, and there

were several people who found garnet when I was there. They were little tiny garnets. We were all looking through the sand and trying to find the gold. Yeah that was one of the most fun things.” (1972, female)

We just hiked out, I don’t know how far. It seemed like a long way we hiked out. We got to this stream, and we all [had] these little cake pans with us... And you know they just showed us how to kind of scoop up some dirt and sift it out. And I think one of the kids actually found a little, you know, nugget of some quality of gold or fool’s gold or something. It was really exciting for everybody. I guess it just kind of takes one every so often, and then everybody knows, well somebody in the last group found some, and then everybody’s all excited about that. (1978, male)

Providing Opportunities for Emotional Engagement: Non-instructional Time

Structured activities related to natural and local history fill only part of the 24-hour-a-day experience that is ROEE. Students also eat together, socialize at night, and sleep in a new place. For many participants in the Bradford Woods programs, these components led to emotional engagement in the experience and personal growth.

Spending the Night Away from Home

Participants experienced challenge, excitement, and novelty on a variety of levels as a result of spending two nights at Bradford Woods. For some, this was the longest they had been away from their parents, especially without talking to them on the phone. For others, it was the first time they had slept in the company of classmates rather than relatives. The experience of camping, sleeping in a platform tent with only three other fifth graders and no adults, was exciting and a bit scary for many. Being fully responsible for their bedding, clothes, and the cleanliness of their living space was new as well. As a result of all these firsts, many participants felt a greater sense of independence and a feeling of being grown up at the conclusion of the program (see Figure 2).

Figure 2. Spending the night away from home at Bradford Woods was exciting for participants and fostered personal growth.

For me it was my first experience away from my home. I had done like little camping trips in the back yard and stuff, but it was the first time I actually got away, where I was sort of on my own. Away from my folks, away from parental support, that kind of thing. And I remember it was just a really neat experience because we packed up our stuff. We got to ride the bus out, and I just remember we got into a little cabin out there, and I was [with] three other girls, and they were all my age....I had been around kids at school but not in a home situation. (1963, female)

I had never been away from home before for a number of days except for at relatives'.... It was a little bit of independence and freedom and, you know, what's out there in the world kind of thing, I guess. (1969, male)

And you know it was just like a really grown-up feeling. You were expected to keep your tent all cleaned up for those two days...I just remember it being so fun and feeling like something special or like a grown up and learning things...I wish I could remember every second of it even now. (1982, female)

I don't know why—it just kind of made my world bigger...I vividly remember coming home, and my mom picking me up that day...and I just remember thinking, I'm an adult. I can do this on my own. (1982, female)

I think that as a person maybe it made me a little more independent because I didn't really stay away from my parents very long, especially two nights away was a lot. (1992, female)

Responsibility and Achievement

Students had opportunities to succeed and win recognition in relation to the non-instructional aspects of the program. For example, study participants recalled going to great lengths to win a tent competition, not only making their beds and picking up litter but decorating with items from home and from the natural landscape. Table groups and their hoppers (servers) were able to win similar awards in the dining hall for best set-up and service to each other. Such competitions gave students a chance to exercise their creativity, work as a team, and be responsible for their living space.

Students could also earn awards for helping others, dealing well with a challenge, or being particularly enthusiastic. For example, participants recalled assisting a sick friend in the night, patiently allowing a teacher to remove ticks from her hair within minutes of arriving at Bradford Woods, and happily splashing in puddles throughout a long hike in the rain. Some awards were individual while others were group oriented. Good deeds were also rewarded through the Rainbow Trail program. All of these more social awards encouraged cooperation and made it possible for students to excel in many areas. As one participant explained, “I thought that was pretty neat actually, and I can remember feeling like that they gave the awards sometimes to kids that in our class didn’t seem to get a lot of awards. And that was big for them” (1978, male). To elementary-age children, earning an award from a revered teacher in front of one’s peers meant a lot and was very memorable.

Emotions Experienced and Remembered

The vast majority of people interviewed recalled enjoying nearly all aspects of their Bradford Woods experience. For some it was the highlight of elementary school and a particularly positive memory from childhood. Even those individuals who had less detailed memories of the program or did not think it had much of an impact on them, spoke positively of the experience.

Some students did experience unfortunate or challenging situations at Bradford Woods. These were memorable too and included getting sick, falling and bruising a rib, being cold at night, wetting a sleeping bag, having a mean tent-mate, feeling scared, and getting very wet on a trail hike. In no case did one of these challenges prevent the person from having an overall positive assessment of the trip. While educators would not choose to impose these particular

challenges on students, it is worth noting that difficulties as well as fun times remain in participants' memories for years to come.

Learning from Teachers and Peers

Interacting with Teachers

The Martinsville program at Bradford Woods was unusual in that it was designed and directed by local teachers rather than staff from the ROEE center. Each year, one or two science teachers (called directors) from the middle or high school would stay at Bradford Woods for six weeks and teach all the classes in conjunction with the fifth-grade teachers. In later years, some Bradford Woods staff assisted with the instruction. Parents did not accompany groups as chaperones.

Participants remembered the directors from the high school with great fondness and admiration. Two in particular who spent eight years each directing the program were discussed in detail. They were remembered for being knowledgeable, enthusiastic, caring, great at telling stories, and engaging instructors on the trail (see Figure 3). Often the students had these teachers again in high school where they were just as well liked. Interestingly, many of the teachers connected with the program went on to be principals, administrators, and individuals highly regarded in the community, which may have provided a strong foundation for the program, helped it continue over the years, and served as frequent reminders for students of their fifth-grade trip.

Figure 3. The high school teachers who directed the program made a significant impact on students.

I treasured that man. I mean he taught me so much...and he touched each child in a way that you know you just don't forget that, throughout your life time. He understood the trees. He understood the leaves. He understood why the squirrels needed to hide their nuts and he explained all that to us in such a way that we just adsorbed it like a sponge. I mean I really, really enjoyed it. And I thought it was great. (1968, female)

And then the night time star gazing, storytelling time. He would always come out and tell stories about the stars and show you the constellations and what they meant and things and he did that when I was in 5th grade but he also did it when my girls were in 5th grade too. So that was kind of neat. And he actually goes to our church now, so it was kind of nice to reminisce about some of those times with him, you know. (1963, female)

One of the things that I really remember was more like a person or a group leader that was in charge. And later on I realized who he was...he was a science teacher at the high school, but when you're in fifth grade you don't realize that. He just made it fun and enjoyable. He would tell stories at the campfire. I remember things like that. When we'd go for nature walks, he was the one that did a lot of the teaching. So I just really remember him and just how exciting and fun he made that experience....People like that working there. He's just a special, special person. (1969, female)

The instructor, he was just a great influence on my life. As a role model.... He made the experience just so wonderful. He just really gave you good positive things to look forward to in life. (1970, female)

[The high school teacher] I would have to say. Yeah, he was there and I thought he was a real influence. He was fun. (1971, male)

Interacting with their fifth-grade teachers at Bradford Woods also proved memorable and influential for participants. They recalled their teachers introducing trees and plants at school in preparation for the trip, telling stories and teaching lessons on the trail, and singing songs in the evenings. Some also recalled the novelty of spending time with teachers outside of the classroom. They discovered that they were ordinary people and, in some cases, strong women

comfortable in the outdoors. Lastly, the teachers provided continuity between the classroom and the ROEE experience in terms of content and expectations (see Figure 4).

Figure 4. Students benefited from interacting with their teachers outside of the classroom.

And when you're a kid...it's like when you go away from school, it's like the teachers stay in school and ... go underneath a baseboard or something, and kind of wait for a minute, and they were there [at Bradford Woods] after school hours, with you at night and in the early morning, and it was kind of a weird sensation to have the teachers there with you. (1968, male)

One of the most memorable parts for me was that I had a first-year teacher. And she was just really into it...So our preparation for going there was unbelievable. I mean just the study of the things we were going to be seeing while we were there and singing the songs, and all of that is a great memory for me. (1972, female)

My teacher, she was cool. She was just real earthy. I just thought she was kind of a fascinating person. She came out at night and would sit out there by our tents by one of the trees and she would play the guitar, and it was so neat. It was peaceful, just being out there in nature. (1972, female)

Because I remember my teacher wore slacks and see back then when we were in school, I wasn't even allowed to wear slacks except to Bradford Woods. We had to wear dresses...I'd never seen a teacher not in a dress, so to me that was like real cool. (1963, female)

I remember being on the trails with the teachers and them pointing out the different flowers. And it was just weird being at that time, you know, to see your teacher in a different environment. Get to know them a little bit differently. [They were] in their jeans and their hats, and they were rugged. (1989, female)

Interacting with Peers

A significant aspect of the Bradford Woods program, and of any ROEE experience, is spending time with peers outside of school. Some participants recalled the trip as a chance to spend time with close friends and classmates before leaving elementary school. Others recalled the trip as a time to meet new people and broaden their social group. Shared experiences at

Bradford Woods helped equalize cliques and gave students insight into the backgrounds and skills of peers they had only seen in the classroom, as the following comments reveal:

I think it just teaches kids, it shows them the other side of people...My family camped in tents, and it was just another whole experience to go with other people and my peers and learn things about all of us. The world we live in and the people that were there. (1962, female)

It was a group of kids, no matter what our background, no matter what our diversity was, it was such camaraderie. Everybody was just there. You were all thrown in, you were all doing the same thing. We had some that cried because they missed their moms and their dads, whatever, and that was fine. We didn't make fun of them. (1961, female)

You were there. Everybody was the same there. When you were in school, it was a little bit different, but at Bradford Woods, everybody was basically equal. I mean it was just a good time. (1989, female)

Much of the peer bonding occurred overnight in the tents as students talked into the night, huddled together because they were cold or scared, and reassured those who were homesick (see Figure 5). Friendships solidified or formed at Bradford Woods were carried back to school and beyond, with some participants still reminiscing with current friends about those fifth-grade experiences many years earlier.

Figure 5. The residential components of the trip created or strengthened bonds between students.

What I do remember is that I very much enjoyed the opportunity to be in a group of my peers at that time. I had camped with my family, and so forth but I had not been able to do something like that with my friends. It was a very positive experience for me. I enjoyed it a lot. (1971, female)

We had a very large campfire...and it was just a thing that after spending five years with my fellow students at my elementary school...it kind of brought us all together more than anything else. (1979, male)

You know it was just all guys in one tent with our bunks so that's kind of interesting. It is a little different than like spending the night at somebody's house. You're kind of just out in the woods. There are some amenities, but it's still different. (1971, male)

I remember sharing a tent/cabin or whatever with all my friends, and every night we'd push our beds together and just have a big slumber party every night. And we froze, but it was a lot of fun. So I just remember that, every night going to bed and getting in trouble by the teacher because we wouldn't, you know, hush down, but it was really fun. (1992, female)

The thing I remember the most about the tents is I was with a group of my friends...and we kept flipping out because there were all these...bugs on the top of the tent....And then one of [the girls] like in the middle of the night, because you could easily fall out of the tent, she just rolled off of her bed and fell on to the ground. And she was just like aaaaahhh....Then I was so scared in the tent that I was going fall out. (1992, female)

And I remember it rained when we were there...just enough to make everything a little muddy and slippery...this was the day we went on our hike, and we had lunch out...so there was trash and one boy carried the trash. And I remember thinking at the time, he's carrying that all the way back. Two giant trash bags, you know. And then in another part of [the hike] we had to go down this giant hill, and of course it had been raining, and this boy--I mean we're fifth graders--and this boy just stops and helps every single person down the hill, and at the end of the day they got the little cut-log awards. I know their names and everything. I just remember, even as a fifth grader, being impressed he's carrying that all the way back and he's helping. (1982, female)

And ironically enough, one of my best friends that was there is now a principal in a school in this district, and we still remember sharing that cabin and doing stuff. It was just, the overall experience was real positive, and it was neat to be able to get away from home for the first time. (1963, female)

Experiencing a Natural Setting

Spending three days and two nights camping in a natural setting was enjoyable for nearly all the participants. The Martinsville school district includes both rural and town schools, and students had spent more or less time in natural areas depending on where they lived. While a few of the more rural kids commented that "there were just more trees," many enjoyed learning more about what surrounded them, and some noted that, just because they lived on a farm, didn't mean they went camping and hiking (see Figure 6). Participants who lived in the town of Martinsville

either described their trip to Bradford Woods as a rare opportunity to be in the woods, or if they went camping with their family, as a chance to camp with classmates (see Figure 7).

Figure 6. Aspects of the Bradford Woods experience were new and interesting even to rural students.

And I guess that would be one thing, learning about what's in the woods, even though I lived on a farm, we didn't really go hiking in the woods all that much. (1960, female)

I lived out in the country, and we had 20 acres, and you know we gardened and things like that. But [I had] never been camping. (1969, female)

It's just an enjoyable experience. I wouldn't think so just because of growing up in a rural area, and I spent lots of time outside already, but it was just so unique. You know being with my classmates and teachers and thinking of it more from an educational standpoint than just being out there running around in the woods like I normally did. (1972, female)

What I think that I took away with me was a better appreciation of nature and of what there is to learn about it. I grew up out in the country so being outdoors like that wasn't a new experience for me, but finding out all the things you could learn about the plants and the benefits of the different plants that grew wild or like I said the tree thing that I don't remember what that was. But I remember that impressing me like, oh look, that's something you wouldn't know unless you had had that experience. (1971, female)

And I think it's because I was used to the woods. I grew up on a farm, and we went camping a lot... And so it wasn't an earth shattering experience for me or anything. It was *fun*, and like I said I felt like I learned a lot about trees, but as far the camping experience and all that, I'd done that so it wasn't anything unusual for me. (1980, female)

Figure 7. For children who lived in town, Bradford Woods was an unusual opportunity to camp, hike, and learn about nature.

It really made me appreciate nature. Because up until that time, I'd been pretty much a city kid. And to actually get out into the woods, and you know, walk on something that wasn't concrete or asphalt, see trees where you can see more than ten, you know, planted in a row. It made me realize that I wanted to live in the country when I got older. (1972, male)

And I just think you know it was nice to be out in nature because most city kids like me didn't get out in the country very much. (1962, female)

The experience itself I think stands out in my mind so much just because I'd never been camping before. That's just not something my family did. My mom and dad worked 7 days a week, and they had 4 children, and we lived in maybe not the best area of town in a tiny apartment...I'd never been away from home without my parents *ever* ...so just the experience itself because it was so beautiful, and I might as well have been 100 miles away. Truly, I did not realize how close BW was until a few years later because to me it was like we might as well have been on vacation in another country. You know it was just so pretty and areas that I had never got to experience anything like that before. (1982, female)

And then learning about all the nature, the trees, the flowers, the plants, I was just like, because I had never been out in the woods very much. [BW] just opened up a whole new world for me. So I loved it. (1970, female)

In the long term, it's always impacted my life, just made me-I don't know-I love nature now. Because before I always liked to be outdoors, but I never camped except here. That was the first time I ever stayed in a tent, that I ever remember. And we love to go camping as a family and we love the outdoors. I live in the country. (1970, female)

Just it was kind of the first time I think. My family, we didn't camp at all, we weren't campers. So that was kind of the first time I'd ever even been in a tent overnight and done something like that, so that was kind of neat. I do remember taking walks through the woods, and just thinking BW was huge and just all the trees and the leaves. It was pretty cool. It felt like we were in a totally different [country], you know, even though we were only 10 miles from town probably, it just felt like we were far away and kind of in our own little world. I enjoyed it. (1982, male)

Connecting the Experience to Home: Novelty and Familiarity

As discussed above, the trip to Bradford Woods was a "first" for many people. It was a first time away from home, a first time camping with friends, a first time studying natural history, a first time interacting with teachers outside of school, or a first time in a natural area. Other aspects of the program were distinctive or "special," such as the campfire, panning for gold, or getting to go on a much anticipated fifth grade field trip. The uniqueness of the experience was enhanced by anticipation of the trip.

Although the location was close to town and the leaders were familiar from school or the community, going to Bradford Woods was an event, novel and unique in its entirety.

Participants' comments indicate enhanced engagement with and subsequent memory of all aspects of the program, whether the activities themselves were novel or not:

I really enjoyed my time, and you know when I reminisce with some of my friends, we always bring up Bradford Woods because it was a time in our life. I mean when you were in grade school you looked forward to fifth grade so that you could go to Bradford Woods for three days. It was like, wow, we get away from home for 3 days. (1962, female)

I enjoyed it. It was one of the main things you looked forward to in elementary school was getting to be a fifth grader and getting to go to Bradford Woods. Everybody had a big time. For me it was probably the first time being away from my family. That was a big deal for me. (1965, female)

And it was a very big experience. Everybody always looked forward to it. It was like a tradition type thing. Once you got to be that age...then you got to go to Bradford Woods. (1969, male)

The specialness of the experience did not prevent transfer to home. Tentmates at Bradford Woods were classmates at school and bonds lasted. The trees and plants growing at Bradford Woods were the same ones that grew in people's backyards. Camping skills could be used on future trips. Many participants described being able to identify species when they got home, and some have now begun sharing that knowledge with their children. Therefore, Bradford Woods was indeed *a first* experience for many participants, but due to the applicability of what was learned, not an *only* experience (see Figure 8).

Figure 8. Information learned at Bradford Woods could be used at home both in childhood and in later life.

And it just really made you appreciate and enjoy more of the nature. I know that my grandfather really enjoyed some of the things that I learned because he was very much an outdoorsman type person. I could walk through the woods with him for short trips but walk through them a little bit and look for different things and feel a little more educated about it than what I was previous to that. (1979, male)

My dad was a carpenter and taught me about wood, which never seemed to make sense to me, but he had never actually taught me about leaves, and so I was really proud that I knew. You know, he knew more than I did, by far so he didn't hesitate to tell me that I was just beginning to learn that, but I was really proud of my knowledge, and I think we had, to follow up with that, we had an excellent science program in the junior high. (1962, female)

What better way to teach the kids about the trees that you live with everyday? I loved that. (1961, female)

I would say it broadened my knowledge of a lot of, you know, natural things. I mean immediately. I lived in the woods, so it was still practiced often. You know, my neighbor went at the same time, and so she's there, and so we're reliving Bradford Woods when you come back. (1971, male)

Yeah, the tree walk. I learned a lot of stuff, and then ... when I was at home like with my mom, I was like oh, don't step on that such and such flower, you know. But I did learn a lot of the trees and flowers and stuff. I still remember most of them. (1990, female)

I liked the trees; for some reason the trees part of it just stuck with me and to this day. Like in the fall I went out with my kindergartener and collected a leaf off of a bunch of different trees from around the neighborhood, and most of them I was still able to tell him what they were. And that had to have come from Bradford Woods 'cause I haven't studied that any other time since...I don't know if [my teacher] would have graded me 100% on what I told my son all the leaves were, but at least I told him that this is this with enough confidence that he believed me. (1978, male)

I was telling my son that I learned how to identify a sycamore tree at Bradford Woods. And so, I've always remembered certain trees. Sycamore is the one I was telling him about. (1980, female)

I mean it did help me because I still remember a lot of the plants and the trees, and with my kids now, they're asking, "Mommy, what's this?" And then you can actually answer it with a half-way intelligent answer. (1990, female)

DISCUSSION

The most significant finding of our research was that youth ROEE can indeed create detailed episodic memories that endure into adulthood, a period of time far longer than documented in previous studies (e.g., Knapp, 2007). Although those who developed and

implemented the fifth-grade program at Bradford Woods were not guided by current research on episodic memories, many of the components selected for inclusion in the program corresponded with event characteristics shown to enhance memory. Psychology research has shown that active (Zimmer et al., 2001), emotional (Lindsay et al., 2004; Schmidt et al., 2011), distinctive (Catal & Fitzgerald, 2004; Herbert & Burt, 2004; Linton, 1982), and personally important (Catal & Fitzgerald, 2004) events lead to lasting episodic memories, and our research provides an example of these characteristics in the context of ROEE. Students engaged in active experiences such as hiking, identifying plants, panning for gold, living in a tent for three days, and working together in the dining hall. Many of these components were also emotionally engaging and positive. Students experienced anticipation, excitement, and a sense of accomplishment, as well as enjoyment, when interacting with teachers and peers. The trip to Bradford Woods was also distinctive as a rare school field trip, an opportunity to live and learn in nature, and a few days away from home at a critical age. The trip was also important in the community, a fact that led to rehearsal and reinforcement of the memory, as did observing the same ecosystems upon returning home.

Episodic memories are valuable data because they are by definition declarative (explicit) memories still consciously connected to the event that created them. However, most memories are not as precise, complete, or infallible as people might like to believe (Newman & Lindsay, 2009). Extensive research has demonstrated that eye-witness accounts of crimes and memories of child abuse can contain false information or be entirely fabricated, even when the witness believes he/she is telling the truth (reviewed in Thompson & Madigan, 2005). Research on “flashbulb” memories has demonstrated that while many people do have detailed memories associated with significant world events that they expect never to forget, such as the

assassination of U.S. President John F Kennedy (Brown & Kulik, 1977), even these memories can contain errors. Schmolck, Buffalo, and Squire (2000) tested memories held by University of California, San Diego students of learning the verdict in the O.J. Simpson trial and found that 32 months after the event, the majority of recollections contained minor or major inconsistencies with information reported three days after the verdict was announced. However, as Schacter and Addis (2007) suggest, false memories “reflect the healthy operation of adaptive, constructive processes supporting the ability to remember what actually happened in the past” (p. 27). Remembering only the gist of the experience and then reconstructing the details later is not only more economical, but it may also enable individuals to successfully use memories to imagine and perform well in similar situations in the future (Schacter & Addis, 2007). Given that outdoor environmental educators teach with the intention that what is learned and remembered will be applied in new settings, this reconstructive and adaptable nature of memory could in fact contribute positively to our field’s effectiveness.

It was not possible for us truly test the accuracy of reported memories because all data were retrospective. However, we did use a variety of techniques to minimize intentional and unintentional falsification of memories. The structure of the interviews, which collected uncued then cued memories, followed by perceived program impacts and current environmental attitudes and behaviors, reduced the extent to which early questions biased responses to later questions. It was not immediately apparent to participants that the researcher’s interest was in *environmental* education. Even interviewees, such as current teachers, whom we might have expected to overemphasize the academic or environmental gains, did not seem to do so. The outsider status of the researcher may also have discouraged fabricating memories or impacts by reducing the incentive to provide a socially or environmentally desirable answer (Ewert & Galloway, 2009).

Also, Peterson, Parsons, and Dean (2004) found that false information shared with children a year after a significant experience was not retained another year later, that is, the memories returned to their original accuracy. While we do not know whether the memories shared by our interviewees matched what they experienced, it is reasonable to assert that the memories they shared were their own. The local schools did not participate in any other ROEE programs, most interviewees stated that they had not gone to summer camp, and few interviewees had returned to Bradford Woods after fifth grade. Bradford Woods is not open to the general public and this particular ROEE program did not utilize parent chaperones (which would have resulted in adults experiencing the program again).

Interestingly, memories have also been shown to be relatively stable following a precipitous decline in the first few years (Bahrick, 1984; Meeter, Murre, & Janssen, 2005), which not only helps explain why memory levels were consistent across our sample, but also suggests that the memories shared in interviews are the memories that have been and will continue to be carried with past participants through their adult lives. Such sustained memories, even if they contain some inaccuracies, are the ones that have the potential to continue influencing participants for years.

Rickinson, Lundholm, and Hopwood (2009) divide research on environmental learning into three categories: “measuring outcomes”, “exploring processes”, and “research on learners” (p. 25). Although their book focuses on environmental education in formal settings, this typology is helpful in situating our research in relation to other research on EE and specifically on ROEE. Most prior studies of ROEE, such as Johnson and Manoli (2008, 2011) and Stern, Powell, and Ardoin (2008), focus on outcomes, using a pre-post design or other measure to assess changes in knowledge, attitudes, and behaviors as a result of participation in the program. Our research also

sought to measure outcomes of an ROEE experience but focuses on a different type of outcome: long-term episodic memories of the experience. These memories may be related to knowledge gained, attitudes changed, and behaviors learned, or may result in such changes in the future, but in this study it is the memories themselves that are being documented as outcomes.

Fewer studies of EE (and ROEE, in particular) have looked at learning processes. Hungerford and Volk (1990) proposed a model for sequential activities and learning in EE, and Brody's (2005) Learning in Nature model offers a matrix exploring connections between types of activities and elements of the environment. Such models are conceptually important to the development of effective EE programs. Our research also considers the learning (and remembering) that occurs within an EE experience, but focuses more narrowly on program characteristics with the intention of providing specific, applicable information to future educators.

There has been limited research on the learners who come to an ROEE program, their knowledge, interests, and behaviors. Our study is no exception. One of the short-comings of retrospective research is that, unlike longitudinal research, it does not assess the participants before their experience.

Although this research focused on the past, its findings have relevance for current and future programs. Active learning is a core feature of outdoor environmental learning and the relationship between action and memory underscores its importance. It may be more difficult to incorporate hands-on learning into the curriculum now due to legislation and funding, and complex topics such as climate change may seem more difficult to teach in the outdoors than natural history, but our research as well as Knapp's (2007) reveals that students remember what they *do* far more than what instructors *say*.

The importance of emotional engagement in environmental learning is not a new finding either (e.g., Chawla, 2007; Kellert, 2002, 2005), although our work points to the importance of *positive* experiences in creating lasting memories. Rickinson, Lundholm, and Hopwood (2009) found that negative emotions led students to disengage with material, while Dickinson (2009) suggests that fear may lead people to adopt a defensive, controlling stance rather than a pro-environmental manner. Memories shared by participants in our study were overwhelmingly positive, a finding likely due to both qualities of the program and qualities of memory. The program was designed to include fun, active experiences in nature with friends and caring teachers rather than focus on environmental problems. Thus, it is not surprising that many memories of this well-loved program are positive. Interestingly, memories of positive experiences and memories of those positive emotions also tend to last longer (Walker, Vogl, & Thompson, 1997), a quality of long-term memory that may have somewhat biased our results, but also lends weight to the importance of providing positive, emotional experiences through EE.

Knapp (2006) reminds interpreters that, like it or not, their programs are only short episodes in participant's lives. The same could be said of ROEE experiences. The bounded, distinctive nature of such experiences can lead to strong episodic memories (Catal & Fitzgerald, 2004; Herbert & Burt, 2004; Linton, 1982), as shown by our study, but this separation from daily life can also make it more challenging for students to apply their learning to their home environment. D'Amato and Krasny (2011) found that students experienced a significant disconnect between their experiences on an outdoor adventure education program and the lives they returned to. Rickinson, Lundholm, and Hopwood (2009) observed that students were more engaged with material that they considered relevant to their lives, although individual definitions of relevance varied. Our study sheds light on how connections with the human and natural

community at home can be used to foster learning transfer. The trip to Bradford Woods was engaging because it was novel, but the students learned about species found in their backyards from local people in a program discussed regularly with family, friends, and neighbors. The sense of accomplishment at earning one's Rainbow Badge was also increased by the community's engagement with the program. At the current time with limited school budgets for travel and follow-up programs, ROEE may benefit from fostering strong, lasting relationships with local schools and communities.

CONCLUSION

As psychologist Bahrick (2000) notes, “the value of education depends largely upon the life span of what has been learned” (p. 360), and memory research has “now yielded information that is highly relevant to the goals of educators,” making it “incumbent on educators to promote conditions of instruction that yield...long-term retention” (p. 360). Our study explored those conditions in the context of ROEE. It is impossible to predict exactly what students will need to know in the future, but if educators believe that what they are teaching is important, we encourage them to develop and evaluate environmental education programs that are active, distinctive, personally relevant, and engage students emotionally through achievement and social interaction. This study demonstrated that follow-up retrospective research is indeed possible, even 45 years after a program, and we encourage researchers and practitioners to continue this type of inquiry. Longitudinal studies, which collect data on participants before, during, and for an extended period after an event, are needed as well. Such studies could augment our findings by also answering questions related to accuracy of memories, experiences that are forgotten, and changes in perception of the experience over time.

Our study focused on episodic memories, one important and measurable lasting outcome of participation in a ROEE. Additional research is needed to understand how these memories are used throughout one's life and to what extent lasting memories are connected to environmental education's goal of developing environmentally literate individuals who "possess the knowledge, intellectual skills, attitudes, experiences, and motivation to make and act upon responsible environmental decisions" (NAAEE, 1999, p 2).

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REFERENCES

- Auerbach, C. F., & Silverstein, L. B. (2003). *Qualitative data: An introduction to coding and analysis*. New York: New York University Press.
- Baddeley, A., Eysenck, M. W., & Anderson, M. C. (2009). *Memory*. New York: Psychology Press.
- Bahrick, H. P. (1984). Semantic memory content in permastore: Fifty years of memory for Spanish learned in school. *Journal of Experimental Psychology: General*, 113(1), 1-29.
- Bahrick, H. P. (2000). Long-term maintenance of knowledge. In E. Tulving & I. M. F. Craik (Eds.), *The Oxford handbook of memory* (pp. 347-362). Oxford, UK: Oxford University Press.

- Ballantyne, R., & Packer, J. (2006). Promoting learning for sustainability: Principals' perceptions of the role of outdoor and environmental education centers. *Australian Journal of Environmental Education*, 22(1), 15-29.
- Bogner, F. X. (1998). The influence of outdoor ecology education on long-term variables of environmental perspective. *Journal of Environmental Education*, 29(4), 17-29.
- Bogner, F. X. (2002). Influence of a residential outdoor education programme to pupil's environmental perception. *European Journal of Psychology of Education*, 17(1), 19-34.
- Bogner, F. X., & Wiseman, M. (2004). Outdoor ecology education and pupils' environmental perception in preservation and utilization. *Science Education International*, 15(1), 27-48.
- Brody, M. (2005). Learning in nature. *Environmental Education Research*, 11(5), 603-621.
doi:10.1080/13504620500169809
- Brown, R., & Kulik, J. (1977). Flashbulb memories. *Cognition*, 1977(5), 73-99.
- Carter, R. L., & Simmons, B. (2010). The history and philosophy of environmental education. In A. M. Bodzin, B. S. Klein, & S. Weaver (Eds.) *The inclusion of environmental education in science teacher education* (pp. 3-16). Dordrecht, Netherlands: Springer.
- Carleton-Hug, A., & Hug, J. W. (2010). Challenges and opportunities for evaluating environmental education programs. *Evaluation and Program Planning*, 33, 159-164.
doi:10.1016/j.evalprogplan.2009.07.005
- Catal, L. L., & Fitzgerald, J. M. (2004). Autobiographical memory in two older adults over a twenty-year retention interval. *Memory and Cognition*, 32(2), 311-323.
- Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative analysis*. London: Sage.

- Chawla, L. (1999). Life paths into effective environmental action. *Journal of Environmental Education, 31*(1), 15-26.
- Chawla, L. (2007). Childhood experiences associated with care of the natural world: A theoretical framework for empirical results [Electronic Version]. *Children, Youth and Environments, 17*, 144-170. Retrieved from <http://www.colorado.edu/journals/cye>.
- Corcoran, P. B. (1999). Formative influences in the lives of environmental educators in the United States. *Environmental Education Research, 5*(2), 207-220.
- Denzin, N. K., & Lincoln, Y. S. (2005). Introduction. In N. K. Denzin & Y. S. Lincoln (Eds.), *The Sage handbook of qualitative research* (3rd ed., pp. 1-32). Thousand Oaks, CA: Sage.
- D'Amato, L. G., & Krasny, M. E. (2011). Outdoor adventure education: Applying transformative learning theory to understanding instrumental learning and personal growth in environmental education. *Journal of Environmental Education, 42*(4), 237-254.
- Dickinson, J. L. (2009). The people paradox: Self-esteem striving, immortality ideologies, and human response to climate change. *Ecology and Society, 14*(1), 34. Retrieved from <http://www.ecologyandsociety.org/vol14/iss1/art34/>.
- Dijkstra, K., & Misirlisoy, M. (2006). Event components in autobiographical memories. *Memory, 14*(7), 846-852.
- Engelkamp, J. (2001). Action memory: A system-oriented approach. In H. D. Zimmer, R. L. Cohen, M. J. Guynn, J. Englecamp, R. Kormi-Nouri, & M. A. Foley (Eds.), *Memory for action: A distinct form of episodic memory?* (pp. 49-96). New York: Oxford University Press.

- Ewert, A., & Galloway, G. (2009). Socially desirable responding in an environmental context: development of a domain specific scale. *Environmental Education Research, 15*(1), 55-70. doi:10.1080/13504620802613504
- Ewert, A., Place, G., & Sibthorp, J. (2005). Early-life outdoor experiences and an individual's environmental attitudes. *Leisure Sciences, 27*, 225-239.
- Farmer, J., Knapp, D., & Benton, G. M. (2007). An elementary school environmental education field trip: Long-term effects on ecological and environmental knowledge and attitude development. *Journal of Environmental Education, 38*(3), 33-42.
- Furihata, S., Ishizaka, T., Hatakeyama, M., Hitsumoto, M., & Ito, S. (2007). Potentials and challenges of research on 'Significant Life Experiences' in Japan. *Children, Youth and Environments, 17*(4), 207-226. Retrieved from <http://www.colorado.edu/journals/cye>
- Godbey, G. (2009). Outdoor recreation and health: Understanding and enhancing the relationship. Resources for the Future. RFF DP 09-21. Retrieved from www.rff.org/rff/documents/RFF-DP-09-21.pdf
- Gralton, A., Sinclair, M., & Purnell, K. (2004). Changes in attitudes, beliefs, and behavior: A critical review of research into the impacts of environmental education initiatives. *Australian Journal of Environmental Education, 20*(2), 41-52.
- Hammerman, W. M. (Ed.). (1980). *Fifty-years of resident outdoor education: 1930-1980: Its impact on American education*. Martinsville, IN: American Camping Association.
- Henderson, K. A., & Bialeschki, M. D. (2010). *Evaluating leisure services: Making enlightened decisions* (3rd ed.). State College, PA: Venture.
- Herbert, D. M. B., & Burt, J. S. (2004). What do students remember? Episodic memory and the development of schematization. *Applied Cognitive Psychology, 18*, 77-88.

- Holstein, J. A., & Gubrium, J. F. (1999). Active interviewing. In A. Bryman & R. G. Burgess (Eds.), *Qualitative research* (Vol. 2, pp. 105-121). London: Sage
- Hungerford, H. R., & Volk, T. L. (1990). Changing learner behavior through environmental education. *Journal of Environmental Education, 21*(3), 8-22.
- Johnson, B., & Manoli, C. C. (2008). Using Bogner and Wiseman's Model of Ecological Values to measure the impact of an earth education programme on children's environmental perceptions. *Environmental Education Research, 14*(2), 115-127.
doi:10.1080/13504620801951673
- Johnson, B., & Manoli, C. C. (2011). The 2-MEV Scale in the United States: A measure of children's environmental attitudes based on the Theory of Ecological Attitude. *Journal of Environmental Education, 42*(2), 84-97. doi:10.1080/00958964.2010.503716
- Kellert, S. R. (2002). Experiencing nature: Affective, cognitive, and evaluative development in children. In J. Peter H. Kahn & S. R. Kellert (Eds.), *Children and nature: Psychological, sociocultural, and evolutionary investigations* (pp. 117-151). Cambridge, MA: MIT Press.
- Kellert, S. R. (2005). *Building for life: Designing and understanding the human-nature connection*. Washington, DC: Island Press.
- Kihlstrom, J. F. (2009). 'So that we might have roses in December': The functions of autobiographical memory. *Applied Cognitive Psychology, 23*, 1179-1192.
doi:10.1002/acp.1618
- Knapp, D. (2006). The development of semantic memories through interpretation. *Journal of Interpretation Research, 11*(2), 21-35.

- Knapp, D. (2007). *Applied interpretation: Putting research into practice*. Fort Collins, CO: InterpPress.
- Knapp, D., & Benton, G. M. (2005). Long-term recollections of an environmental interpretive program. *Journal of Interpretation Research*, *10*(1), 52-54.
- Knapp, D., & Benton, G. M. (2006). Episodic and semantic memories of a residential environmental education program. *Environmental Education Research*, *12*(2), 165-177. doi:10.1080/13504620600688906
- Leeming, F. C., Dwyer, W. O., Porter, B. E., & Cobern, M. K. (1993). Outcome research in environmental education: A critical review. *Journal of Environmental Education*, *24*(4), 8-21.
- Levine, L. J., & Pizarro, D. A. (2004). Emotion and memory research: A grumpy overview. *Social Cognition*, *22*(5), 530-554.
- Liddicoat, K., Rogers, J., & Anderson, L. (2006). Inclusion at Residential Outdoor Environmental Education Centers: A Survey of Current Practices. *Research in Outdoor Education*, *8*, 119-127.
- Lindsay, D. S., Wade, K. A., Hunter, M. A., & Read, J. D. (2004). Adult memories of childhood: Affect, knowing, and remembering. *Memory*, *12*(1), 27-43.
- Linton, M. (1982). Transformations of memory in everyday life. In U. Neisser (Ed.), *Memory observed: Remembering in natural contexts* (pp. 77-91). New York: W. H. Freeman.
- Lodico, M. G., Spaulding, D. T., & Voegtle, K. H. (2010). *Methods in educational research: From theory to practice* (2nd ed.). San Francisco: Jossey-Bass.
- Louv, R. (2005). *Last child in the woods: Saving our children from nature-deficit disorder*. Chapel Hill, NC: Algonquin

- Meeter, M., Murre, J. M. J., & Janssen, S. M. J. (2005). Remembering the news: Modeling retention data from a study with 14,000 participants. *Memory and Cognition*, 33(5), 793-810.
- Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. San Francisco: Jossey-Bass.
- Newman, E. J., & Lindsay, D. S. (2009). False memories: What the hell are they for? *Applied Cognitive Psychology*, 23, 1105-1121. doi:10.1002/acp.1613
- North American Association for Environmental Education (NAAEE). (1999). *Excellence in environmental education: Guidelines for learning (K-12)*. Washington, DC: NAAEE.
- Peterson, C., Parsons, T., & Dean, M. (2004). Providing misleading and reinstatement information a year after it happened: Effects on long-term memory. *Memory*, 12(1), 1-13. doi:10.1080/09658210344000468
- Palmer, J. A., Suggate, J., Bajd, B., Hart, P., Ho, R. K. P., Ofwono-Orecho, J. K. W., Peries, M., Robottom, I., Tsaliki, E. & Van Staden, C. (1998a). An overview of significant life influences and formative experiences on the development of adults' environmental awareness in nine countries. *Environmental Education Research*, 4(4), 445-465.
- Palmer, J. A., Suggate, J., Bajd, B., & Tsaliki, E. (1998b). Significant influences on the development of adults' environmental awareness in the UK, Slovenia, and Greece. *Environmental Education Research*, 4(4), 429-444.
- Palmer, J. A., Suggate, J., Robottom, I., & Hart, P. (1999). Significant life experiences and formative influences on the development of adults' environmental awareness in the UK, Australia, and Canada. *Environmental Education Research*, 5(2), 181-200.

- Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage.
- Rickinson, M., Lundholm, C., & Hopwood, N. (2009). *Environmental learning: Insights from research into the student experience*. New York: Springer.
- Saldana, J. (2009). *The coding manual for qualitative researchers*. London: Sage.
- Schmolck, H., Buffalo, E. A., & Squire, L. (2000). Memory distortions develop over time: Recollections of the O.J. Simpson trial verdict after 15 and 32 months. *Psychological Science, 11*(1).
- Schacter, D. L., & Addis, D. R. (2007). Constructive memory: The ghosts of past and future. *Nature, 445*, 27.
- Schmidt, K., Patnaik, P., & Kensinger, E. A. (2011). Emotion's influence on memory for spatial and temporal context. *Cognition and Emotion, 25*(2), 229-243.
doi:10.1080/02699931.2010.483123
- Semb, G. B., & Ellis, J. A. (1994). Knowledge taught in school: What is remembered? *Review of Educational Research, 64*(2), 253-286.
- Smith, J. W., Carlson, R. E., Donaldson, G. W., & Masters, H. B. (1963). *Outdoor Education*. Englewood Cliffs, NJ: Prentice Hall.
- Smith-Sebasto, N. J., & Cavern, L. (2006). Effects of pre- and posttrip activities associated with a residential environmental education experience on students' attitudes toward the environment. *Journal of Environmental Education, 37*(4), 3-17.
- Smith-Sebasto, N. J., & Semrau, H. J. (2004). Evaluation of the environmental education program at the New Jersey School of Conservation. *Journal of Environmental Education, 36*(1), 3-18.

- Stern, M. J., Powell, R. B., & Ardoin, N. M. (2008). What difference does it make? Assessing outcomes from participation in a residential environmental education program. *Journal of Environmental Education, 39*(4), 31-43.
- Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (2nd ed.). Thousand Oaks, CA: Sage.
- Tanner, T. (1980). Significant life experiences: A new research area in environmental education. *Journal of Environmental Education, 11*(4), 20-24.
- Thompson, R. F., & Madigan, S. A. (2005). *Memory: The key to consciousness*. Washington, DC: John Henry Press.
- Tulving, E. (1983). *Elements of episodic memory*. New York: Oxford University Press.
- U. S. Bureau of the Census. (1990). Morgan County, Indiana. P043: Residence in 1985--State and County Level.
- U. S. Bureau of the Census. (2000). Morgan County, Indiana. P24: Residence in 1995 for the population 5 years and over--state and county.
- Walker, W. R., Vogl, R. J., & Thompson, C. P. (1997). Autobiographical memory: Unpleasantness fades faster than pleasantness over time. *Applied Cognitive Psychology, 11*, 399-413.
- Wells, N.M., & Lekies, K.S. (2006). Nature and the life course: Pathways from childhood nature experiences to adult environmentalism [Electronic Version]. *Children, Youth and Environments, 16*, 1-24 from www.colorado.edu/journals/cye/.
- Welzer, H., & Markowitsch, H. J. (2005). Towards a bio-psycho-social model of autobiographical memory. *Memory, 13*(1), 63-78. doi:10.1080/09658210344000576

Zelezny, L. C. (1999). Educational interventions that improve environmental behaviors: A meta-analysis. *Journal of Environmental Education*, 31(1), 5-14.

Zimmer, H. D., Cohen, R. L., Guynn, M. J., Englecamp, J., Kormi-Nouri, R., & Foley, M. A. (Eds.). (2001). *Memory for action: A distinct form of episodic memory?* New York: Oxford University Press.

CHAPTER 4

MEMORIES OF RESIDENTIAL OUTDOOR ENVIRONMENTAL EDUCATION: HOW ARE THEY USED?

ABSTRACT

Residential outdoor environmental education (ROEE) programs for elementary and middle school students have been shown to yield lasting autobiographical episodic memories. This article explores how past program participants have used such memories. Psychological literature indicates that autobiographical episodic memories serve three functions (uses): directive, social, and self. Qualitative interviews with a total of 54 teens at two research sites five years after a ROEE experience revealed a variety of directive and social uses for their memories. Directive uses included choosing to participate in similar outdoor recreation activities, being more knowledgeable about and appreciative of the local ecology, and engaging in more environmentally responsible behaviors. The primary social use was to reminisce with friends and classmates about the trip, often with a focus on the social or recreation components. Self uses were more limited, although participants did describe the experience as a source of good memories to enjoy from childhood. By relating a new theory to environmental education, this article offers a different perspective on long-term impacts of environmental education (EE) and the process by which they occur.

INTRODUCTION

Current models of environmental education (EE) emphasize learning during the EE program, immediate behavior change, and transfer of skills to new environments post-program (e.g., Brody, 2005; Gass, 1999; Hungerford & Volk, 1990). What if the goal of EE was instead to

create powerful memories of the experience? How might a theoretical model that emphasizes memory creation and memory use offer insight into the process by which participants maintain or build on changes in knowledge, attitudes, or behaviors post program? Pillemer (2001) argues:

School memories not only provide suggestions for pedagogical improvement; they also contain students' firsthand evaluations of their own success or failure. The impact of schooling is not captured fully by grade point averages and test scores. Each student also carries away the products of personal school experiences, represented in vivid recollections. The memories are not static, passive records of school events, residing outside conscious awareness. Memories of salient educational episodes come to mind repeatedly; they are active, persistent influences on self-concept and life decisions. (p. 78)

Autobiographical memories help us understand ourselves, develop and maintain friendships, and choose our future actions wisely (Bluck, Alea, Habermas, & Rubin, 2005). Research in interpretation, museum education, and to a lesser extent, EE, has begun to document the episodic and semantic memories that result from such programs (reviewed in Knapp & Benton, 2006). Less is known about how people use these memories and how these memories relate to EE's broader goals of developing an environmentally literate and responsible citizenry. In this paper we explore the intersection between emerging psychological research on memory function and the perceived lasting impacts of residential outdoor EE experiences. In doing so, we offer EE a lens through which to assess and understand its effectiveness. More specifically, our research investigates the following questions within the context of a residential outdoor EE program:

1. How do participants describe the **impact** of an EE program years later?
2. How have past participants used their memories of EE programs? Do the memories serve primarily a **directive, social, or self function**? What environmental attitudes or behaviors do the memories direct?

LITERATURE REVIEW

In this section we focus on one form of EE that is likely to result in significant memories, i.e., residential outdoor environmental education (ROEE). After reviewing the literature on outcomes of ROEE, we turn to a discussion of how a focus on memory may enhance our understanding of such programs, followed by a brief overview of the relevant literature on memory.

Evaluations of Residential Outdoor Environmental Education Programs

Residential outdoor environmental education (ROEE) programs in which elementary or middle school students spend up to a week living and learning at an EE center are common and come from a long tradition of outdoor education (Hammerman, 1980) and camping (Eells, 1986). Liddicoat, Rogers, and Anderson (2006) compiled a list of over 350 ROEE programs in the United States, and other studies document their existence in Europe and Australia (Ballantyne & Packer, 2006; Bogner, 1998b, 2002). Such programs typically include hands-on exploration of the natural world, place-based instruction in biological and physical sciences, individual and group challenges, outdoor recreation, and activities aimed at increasing awareness of environmental issues and promoting stewardship (Stern, Powell, & Ardoin, 2008).

Increases in pro-environmental attitudes as a result of participation in ROEE programs have been documented in Europe and the United States using a scale developed by Bogner and Wiseman (Bogner, 1998a, 1998b, 2002; Bogner & Wiseman 1999, 2004). Bogner (1998b) found significant increases in attitude, knowledge, and pro-environmental behavior among 700 German students who participated in a five-day ROEE experience. These increases were larger than those documented for a one-day program and were maintained six months after the program. In

another study of a German five-day ROEE program, Bogner and Wiseman (2004) found increases in knowledge, attitudes, and pro-environmental behaviors in program participants but no change in a control group. Similarly Bogner (2002) found increases in some components of environmental attitudes among French students following participation in a four-day ROEE experience. Using the same scale, Johnson and Manoli (2008, 2011) also documented improvements in environmental attitudes among students who participated in ROEE programs at two U.S. sites. Together these studies have offered the field of ROEE both a well-validated attitudes scale and quantitative evidence of success in changing attitudes through such programs. Unfortunately, only Bogner (1998b) conducted any follow up tests more than a month after the program, so it is unclear whether the changes noted are maintained.

Looking more broadly, Stern, Powell, and Ardoin (2008) assessed the influence of a ROEE program on “participants' connections with nature, environmental stewardship, interest in learning and discovery, and awareness of the Great Smoky Mountains National Park and biodiversity” (p. 31) immediately post-program and three months later. Increases were seen in all areas immediately following the program, but only environmental stewardship and awareness (knowledge) remained higher than pre-program levels when surveyed three months later. This study also noted that longer programs and teacher involvement led to stronger results.

Earlier studies reviewed by Leeming, Dwyer, Porter, and Cobern (1993), Zelezny (1999), and Galton, Sinclair, and Purnell (2004) reported more mixed results. Additionally, Smith-Sebasto and Semrau (2004) found that a ROEE experience for sixth graders significantly improved problem-solving skills and attitudes toward conservation but not nature appreciation, views on recycling and pollution, or environmental science knowledge, despite educational components of the experience related to these goals. More recently, Smith-Sebasto and Cavern

(2006) found that unless students experienced both pre- and post-trip programs at school, the ROEE experience did not have an impact on students' environmental attitudes.

Taken together, the studies of ROEE reported above demonstrate that ROEE can be effective in influencing environmental knowledge, attitudes, and behaviors. However, this success is not always evident, and retention of the gains made by students is less clear.

Memory Theory and EE Research

Current models and theories explaining how EE impacts environmental behavior focus primarily on immediate program impacts. Examples include Brody's "Learning in Nature" (2005) and the many psychological theories reviewed in Heimlich and Ardoin (2008). While these models and theories serve an important role in helping programs develop best practices and achieve their educational goals, they do not address issues related to maintenance or continued improvement of environmental knowledge, attitudes, or behaviors post-program. Hungerford and Volk (1990) took a step in this direction by proposing sequential EE efforts and outcomes, yet their model still did not consider continued program impacts across the lifespan. The Significant Life Experiences (SLE) literature (reviewed in Chawla 1998a, 1998b, and in Liddicoat & Krasny, in press) and related models (i.e., Chawla, 2007; James, Bixler, & Vadala, 2010) do take a longer-term perspective by looking at the sequence of activities beginning in childhood that have led to pro-environmental attitudes and behaviors in some adults. While valuable, these SLE-based models do not speak directly to the potential for a specific education event to have a lasting impact. This shortcoming is significant for a field filled with short, one-shot EE programs. Perhaps more useful is Gass's (1999) model of transfer, which proposes that following a program, participants may employ specific transfer, non-specific transfer, and metaphoric

transfer of skills as they apply their learning to new situations. (For a more comprehensive review of the literature on transfer, see Barnett and Ceci, 2002). However, the concept of transfer focuses primarily on skill acquisition and use, much narrower outcomes than those that have been assessed by short-term evaluations and are desired by many ROEE programs. Consequently, memory-use theory may be a more appropriate way of considering the lasting and continued impacts of participation in a ROEE experience.

The unified concept of *memory* has been divided into types and sub-types based on the processes of acquisition, duration of retention, potential uses, and physiological storage mechanism (Baddeley, 2001; Baddeley, Eysenck, & Anderson, 2009). The broadest division is between short-term and long-term memory. Long-term memories are divided into *declarative* (explicit) memories--those that can be retrieved intentionally--and *non-declarative* (implicit) memories-- those that guide performance but are not consciously recalled (Baddeley, 2001; Baddeley et al., 2009). Declarative memories can be further split into two categories, *semantic*, which is generalized knowledge, and *episodic*, which are memories tied to specific events. Episodic memories can include knowledge of the world gained through those events as long as that information is still retrieved in connection with the specifics (such as time and place) of the event (Baddeley, 2001; Baddeley et al., 2009). The large subset of episodic memories that relate particularly to one's own experiences are typically considered *autobiographical* memories (Kopelman & Kapur, 2001; Tulving, 2002), although some researchers (e.g., Conway 2002; 2009) are beginning to draw further distinctions between episodic and autobiographical memories. As Kihlstrom (2009) explains, *autobiographical* memories are not only remembered episodes but episodes that relate to oneself ("auto") and that are part of one's coherent life story ("biography").

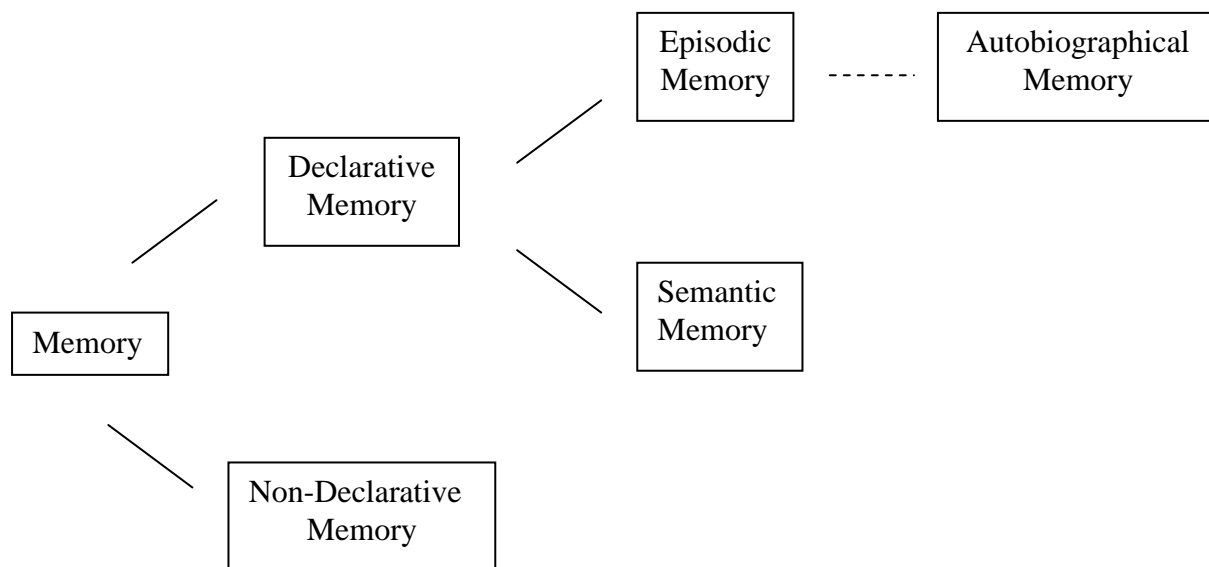


Figure 1. Types of long-term memories (Baddeley, 2001; Baddeley et al., 2009).

Our decision to focus on episodic, and primarily autobiographical memories in this study, was based on both program design and research expediency. ROEE experiences are almost by definition episodes (Knapp, 2007), although some programs do work with classroom teachers to extend learning through pre- and post-program lessons (Ballantyne & Packer, 2006, Smith-Sebasto & Cavern, 2006). The program that occurs at the nature center (the ROEE experience) is generally short, bounded in time, and clearly different from every-day life in the view of the participants. Consequently, we would expect the programs to result in specific episodic memories tied to the event, rather than generalized knowledge (semantic memories) based on multiple similar experiences. Because ROEE programs emphasize personal experiences with nature, social interaction, and desired future actions, we would also expect many of the episodic memories retained to be of the autobiographical sort. This is especially true in situations where

attending the ROEE program is a rite of passage or an anticipated extra-curricular component of the school experience. Such experiences become part of one's life story or biography.

As has been observed by Knapp and Benton (2006), episodic memories are also particularly well suited to being studied post-program. They are inherently linked to the event that created them. Although episodic memories can be influenced by subsequent events (Baddeley et al., 2009), their clear connection to the ROEE experience makes them a more reliable and valid measure of long-term program impact than general environmental knowledge, attitudes, or behaviors whose origins are unclear when significant time has elapsed between the program and the assessment (Knapp, 2007).

Much of the previous work on episodic memories of EE, interpretation, and ROEE has been conducted by Knapp and colleagues (Knapp & Benton, 2006; Farmer, Knapp, & Benton, 2007; Knapp, 2006, 2007). They used qualitative interviews to discern what youth and adults recall many months after a program and make suggestions based on memory theory as to how EE and interpretive experiences can be more memorable. Knapp and Benton (2006) observed a five-day "Expedition Yellowstone!" (ROEE) program and then contacted ten participants by phone one year later. Students were able to relate specific information about games they played and to describe aspects of program content, as well as talk about the positive and negative emotional aspects of the trip. Farmer, Knapp, and Benton (2007) also interviewed 15 fifth-grade students a year after they participated in a one day interpretive field trip to the Great Smokey Mountains National Park. Their results revealed that students did recall specific information learned and activities engaged in during the program, and many expressed what could be considered a more pro-environmental attitude as a result of the program. Based on these studies and evaluations of numerous other programs, Knapp (2007) suggests that interpretive programs

involving active learning, repetition of concepts, and personally-relevant information are particularly memorable.

Bluck and Alea (2002) and Bluck (2009) explained that there are (at least) two approaches to studying memory: studying how memory works and studying why it works the way it does. Most memory research, especially prior to the 1990s, as well as most environmental education memory research has focused on the first question. Such work on how memories are created has many practical applications in the field of ROEE. For example, Knapp's (2007) book, *Applied Interpretation* is based on episodic memory research and offers specific ways in which programs can increase participant engagement and information retention. The second approach, looking at why memory works the way it does, has been less studied but also has significant merit. Calls for more applied research by Neisser (1982) and Baddeley's (1988) more pointed question "But what the hell is it for?" have led to an increase in psychological research on functional memory, that is, research on the uses of autobiographical memory. Our research brings this trend to the EE literature, considering data on how people believe their ROEE experiences have impacted them in light of the memory uses proposed by psychologists (see figure 1). Memory *use* (how people use their memories) and memory *function* (what functions memories serve for people) are used interchangeably in this paper, as well as in the literature.

Autobiographical Memory Use

The functions (uses) of episodic autobiographical memories have been divided into three main categories: directive function, social function, and self function. These functions are described below based on the psychology literature, as a foundation for our work exploring their application to memories of ROEE experiences.

1. When autobiographical memories of prior experiences are used to direct actions and make predictions about the future, these memories are serving a *directive* function. Although typically this directive function relies on semantic memories (general knowledge) because those memories are more broadly applicable, Pillemer (1998, 2001) notes that individual events, not just repeated experiences, can also be directive, and research by Bluck et al. (2005) supports the existence of a broad directive function for episodic memories. Pillemer (1998) has identified six categories of directive functions. *Memorable messages* are “spoken statements” whose directives are followed literally when the message is recalled. *Symbolic messages* are less specific statements that are interpreted by the listener and when recalled influence future actions. *Originating events* and *turning points* are beginnings, events that start a person on a new path, such as a new career or a new friendship. In contrast, *anchoring events* validate and reinforce a current set of beliefs or choices, thus allowing them to continue to influence one’s actions and decisions. *Analogous events* are events that are recalled in a similar situation to provide guidance as to how one should behave.
2. Autobiographical memories serve numerous *social* functions. They allow people to converse, sharing stories to forge new relationships and maintain intimacy with friends and family. They may also foster empathy between people as they share similar stories. (Alea & Bluck, 2003; Kihlstrom, 2009).
3. Autobiographical memories enable a person to develop and maintain a coherent sense of *self* over time. Memories of experiences and actions contribute to identity formation and construction of a continuous life story (Bluck et al., 2005). They enable a person to reflect on their past and present selves, assess progress toward goals, and envision a

consistent future (Kihlstrom, 2009; Williams & Conway, 2009). Memories can also support personal change and self-regulation across adulthood (Bluck et al., 2005).

METHODS

Methodology

Qualitative methods have been described as “study[ing] things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meaning people bring to them” (Denzin & Lincoln, 2005, p. 3). Similarly, Merriam (2009) states that, “qualitative researchers are interested in understanding how people interpret their experiences, how they construct their worlds, and what meaning they attribute to their experiences” (p. 5). In keeping with this approach to research, our study looked at how people have interpreted their ROEE experiences, what meaning they have found in them over the years, and how they have used memories of these experiences to construct their current lives, views, and actions. Qualitative methods were appropriate for this project for other reasons as well. Limited prior research on memories and their uses in EE necessitated an exploratory, inductive approach to data collection and analysis (Merriam, 2009). The size and bounded nature of the programs necessitated gathering detailed, site-specific information from a small sample of individuals (Lodico, Spaulding, & Voegtle, 2010). Qualitative methods were also particularly appropriate due to the retrospective nature of this study in which participants were reflecting on an experience in natural (not laboratory) settings. Because such reflection, or reminiscing, is often a social activity, interviews were a logical and evocative way to gather memories (Kihlstrom, 2009), and enabled participants to describe remembered experiences and examine their meaning and impact through self-reflection and conversation (Holstein & Gubrium, 1999).

The research presented in this paper is one piece of a larger grounded-theory study of episodic memories of ROEE and their use post-EE programs. A grounded theory is one that is “derived from data, systematically gathered and analyzed through the research process” (Strauss & Corbin, 1998, p.12). The researcher generally begins the research process by selecting a problem to investigate based on the published literature or professional experience, chooses a research method, and then allows themes that emerge from the data to direct additional library research, data collection, data analysis, and eventually theory formulation (Strauss & Corbin, 1998). Once initial themes and theories have been formulated, confirmatory data are collected to expand, verify, and alter the proposed theory. Related theories can be brought in at this point as well (Auerbach & Silverstein, 2003). The data presented in this paper represent the beginning of the confirmatory phase. Therefore, we used data-analysis procedures such as coding and constant comparison that are rooted in grounded-theory methodology but are now used more widely in applied social science research (Merriam, 2009).

Methods

Data were collected at two distinct research sites, the North Cascades Institute and the Teton Science Schools, that offer programs that are similar in structure but different in accommodations, geography, participant background, and curricular focus. These two cases were selected not only for their theoretical relevance and variety (Eisenhardt, 1999), but also for their richness, history, and practicality. Stake (2005) argues that “even for collective case studies selection by sampling of attributes should not be the highest priority. Balance and variety are important; opportunity to learn is often more important” (p. 445).

The research sites were purposefully selected based on a variety of criteria. They were intended as confirmatory sites (replications of each other) (Yin, 2006), although differences between their locations, programs, and participant groups did provide some contrasting information. The programs at both sites can be considered leaders in the field of ROEE. They are well regarded by colleagues, are involved in national professional organizations, have long-standing contracts with numerous schools and school districts, are expanding and altering their programs to remain current, use curricula that are in keeping with the Guidelines for Excellence developed by the North American Association for Environmental Education (NAAEE, 2009), and offer graduate programs to train future practitioners. We chose to focus specifically on their fifth and seventh grade programs because they are the longest running and most similar to those offered by ROEE programs around the United States and in other countries. The two sites also met a variety of logistical criteria that made conducting retrospective research possible. They each have been offering ROEE programs for all fifth or seventh grade students from a relatively small school district for over 20 years and thus all students in the town or county, regardless of economic background or teacher interest, participate in the program. The long-standing relationship between the school district and the ROEE center assured local interest in the research and access to high school students as retrospective study subjects.

Data were collected sequentially, first at the North Cascades Institute and second at the Teton Science Schools. As was appropriate for a qualitative grounded theory study, some changes were made to the methods as the study progressed (Eisenhardt, 1999; Charmaz, 2006).

The interview guide for both sites was developed from earlier retrospective research by the author (Liddicoat, 2012) and by Knapp (2007), as well as literature on memory use (i.e., Pillemer, 1998; Bluck et al., 2005). The interviews were semi-structured, which allowed the

interviewer to reword questions, follow up on statements by participants, and reorder topics as needed (Rubin & Rubin, 1995). Some questions related to memory use were expanded and refined over the course of the interviews at the North Cascades Institute and in preparation for interviews at the Teton Science Schools. The overall outline followed a “funnel” format (Kerlinger & Lee, 2000, p. 696) with questions becoming more specific as the interview progressed. This approach allowed the interviewer to collect un-cued memories, followed by cued memories (Baddeley et al., 2009) and then by reflections on impact. Questions were reviewed for face validity by program administrators and researchers in the fields of education and psychology. Approval was obtained from the Cornell University Institutional Review Board, and procedures to ensure informed voluntary participation and confidentiality of identifying information were followed.

Once transcribed verbatim by the first author, interviews were analyzed using ATLAS.ti qualitative data analysis software. Following the procedures outlined by Auerback and Silverman (2003), I read all of the data multiple times and then selected “relevant text” from each interview for further analysis. I next wrote a memo for each passage of text selected indicating its importance and reflecting on its meaning in relation to my research topic and other transcripts (“pre-coding,” Saldana, 2009). As repeating ideas emerged from the data I began recording them and grouping them in categories that later became themes. After reviewing all transcripts from one site, I compiled a list of codes based on the themes that emerged from the data and began assigning them so that I would be able to sort quotes and memos by theme rather than by interviewee. During this process, I used constant comparison to refine my codes, sometimes returning to earlier interviews to recode, group codes together, or split broad codes into two or more codes. Types of initial or open codes (Strauss & Corbin, 1998; Charmaz, 2006) used

included structural codes (indicating question asked), descriptive codes (identifying topics), process codes (describing actions or cause and effect), and holistic codes (broader concepts) (Saldana, 2009). After reviewing the data coded for each theme, focused coding (Saldana, 2009; Charmaz, 2006) was used to group themes together into emergent categories. At this stage of the analysis, the three autobiographical episodic memory function categories from the literature (self, social, and directive) were compared with the emergent categories and used to provide further organization and insight. Lastly, I compared and contrasted findings from the two research sites to explore similarities and differences in the way people recalled and used their ROEE experiences (Eisenhardt, 1999; Yin, 2006).

As I refined my emergent categories and themes, I strove to make them sensitive to the data, “exhaustive” yet “mutually exclusive,” and “conceptually congruent” (Merriam, 2009, p. 186). As would be expected, my findings and categories did not fit perfectly with the additional layer of organization imposed by the theory-based memory function categories (i.e., self, social, and directive). Consequently, these three functions are used as a broad framework in presenting the findings but not as the sole determinant of what is reported and discussed below.

Research Sites

North Cascades Institute is located in northern Washington state with an administration office in Sedro-Woolley and a residential learning center in North Cascades National Park. The institute was founded in 1986 and now offers residential EE for school groups, adult education seminars, high school summer programs and a graduate program. This study focused on “Mountain School,” a tent-based, three-day program for fifth graders and was conducted with the Mount Vernon school district. (The program has since moved exclusively to the Learning Center

as of 2006.) Mount Vernon, WA is located in the same (Skagit) watershed as the site of Mountain School but is located about 70 miles to the west and has a much flatter landscape. The school district includes six elementary schools, two middle schools, and one high school, and is a community that has become increasingly culturally diverse over the past 10 years.

The Teton Science Schools are located near Jackson Hole, WY. The organization began offering programs in 1967 and now includes six distinct components: EE programs, a teacher learning center, the independent K-12 Journeys School, a graduate program, an ecotourism business named Wildlife Expeditions, and a conservation (natural resource) research center. This research focused on the residential outdoor EE programs for late elementary and middle school students. I worked with the Teton County schools, which have sponsored the 3-day “Teton Fifth” and “Teton Seventh” grade programs for over 40 years. This district includes six elementary schools, one middle school, and one high school.

In Mount Vernon, I had access to an ad hoc or convenience sample of students (Weiss, 1994; Williams, 2002) who attended Mountain School because students had to be interviewed in their free time. The diversity of my sample was increased by the opportunity to recruit tenth grade students from all (required) biology classes, but limited by my dependence on sixteen-year-olds remembering to show up for an interview. My sample size of 18 represents only 58% of the students with whom I scheduled an interview and might be skewed toward more responsible, high achieving students.

In Jackson Hole, I was again dependent on volunteer interviewees due to human subject requirements, but was able to obtain a larger and likely more varied sample. I interviewed 22 male and 14 female 12th grade students (a total of 36), nearly all of whom had participated in both the fifth and seventh grade programs. I recruited interviewees by speaking to a required

course and was allowed to interview students during class. Because I was working with 12th graders, many were already 18 years old and could sign their own informed consent forms, which further increased my ability to recruit research participants. The 36 students I interviewed were 56 % of the total who agreed to be interviewed. I recruited from a group of approximately 120 12th grade students, 84 of whom indicated that they had attended the Teton Science Schools, with 76% of these stating that they would be willing to be interviewed.

Trustworthiness

While researchers continue to debate the appropriateness of the concept's validity, reliability, usability, and objectivity in evaluating qualitative research, a variety of techniques have been proposed to assure readers of the trustworthiness of qualitative data and its interpretation. To enhance credibility (akin to validity), I used prolonged engagement with my research sites and my data, peer review, researcher reflexivity, and to some extent, member checks and triangulation (Lincoln & Guba, 1985; Merriam, 2009). At my first site, I spent over a month observing current programs, reviewing curricula, interviewing past instructors and school teachers, learning about the organization from its leaders, and becoming familiar with the history and ecology of the North Cascades. After completing my interviews, while transcribing and conducting preliminary analyses of my data, I worked as a Mountain School instructor myself. The applied findings of my study were presented to and discussed with the entire North Cascades Institute staff. My multiple sources of information and extensive contact with this research site helped me to discover emergent themes in my data and draw credible conclusions from my limited number of interviews.

At the Teton Science Schools, I used many of the same techniques, but in different relative proportions. Because I was able to interview more past participants, by the end of my interview analyses, I was no longer discovering new ideas or themes (reached saturation, Lincoln & Guba, 1985). To complement this strong data set, I spent two weeks learning about the program through personal experience, reflection, and conversations with program leaders and school teachers. As at the North Cascades Institute, I presented my preliminary findings to the staff of the Teton Science Schools and sought input from them regarding my findings and conclusions.

The transferability or generalizability of qualitative research is always questionable and may be limited to what Williams (2002) calls “moderatum generalizations” (p. 139). He notes that programs often have “some shared norms and a common language, and physical referents can allow at least some reciprocity of perspective between research and researched, as well as viable comparisons between places” (p. 137). Indeed, many ROEE programs, not just the two in my study, have similar goals, curricula, and student populations. Leaders of these programs may, therefore, be able to see connections to the data presented below and thus draw conclusions applicable to their own needs and facilities.

RESULTS

Similar themes emerged from the interview data from both sites. These themes were then organized into groups based on the three memory functions found in the literature: directive, social, and self. Directive functions are reported first, in the greatest detail, and by ROEE site because they are most closely aligned with the goals of EE. Social and self functions follow, with information from both sites presented together due to commonalities in the results. Data on

memory use were gathered using multiple questions in each interview related to perceived impacts of the program, times and situations where the ROEE program was recalled, and explicitly stated memory uses.

Directive Function: Outdoor and Environmental Views and Behaviors

In keeping with the mission of outdoor environmental education, many of the directive uses of memories from both sites centered around environmental awareness and enthusiasm for outdoor recreation. Students from the North Cascades Institute described ways in which the program sparked an interest in outdoor recreation and inspired specific environmental stewardship views and behaviors. Students from the Teton Science Schools spoke mostly of gaining, recalling, and using knowledge of the local flora and fauna. Some also reported increased interest in environmental stewardship. These results are explored by program below.

North Cascades Institute: Inspiring Outdoor Recreation

For most individuals interviewed, the ROEE experience was their first trip to the North Cascades National Park. For many of them it was also their first time camping in a tent, especially without their family. They appreciated the experience and expressed a desire to do similar things in the future. In some cases, this new found enthusiasm was directly tied to the experience. One participant stated, “it made me want to be outdoors more because I enjoy that. I’m not really like an outdoor person, but it made me want to go camping more. Made me go hiking more” (NCI 3), while another stated, “yeah. I want to go camping more because of how much fun it was when I went” (NCI 2).

For the smaller number of participants whose families were already participating in outdoor recreation activities, the ROEE experience led to a new perspective, as illustrated by the following two quotes:

Before that I think I only went camping once...and when I went with my family we didn't really do anything like that. And like they showed me how to take care of things better, like with the animals and how much you can learn from them and how they can help you when you are out there and lost. (NCI 7)

We sat by a creek so there was a lot of water running and it was a little bit windy so you could hear the trees, and you could hear like a few animal noises, I guess. Like birds and little chipmunks and stuff. [K: Have you done anything like that since?] Yeah. I kind of make a point of it every time I go camping. I have to go off by myself. I have two little brothers. But yeah, I do make a point of doing that. (NCI 15)

Many of the interviewees expressed more intention than actual participation in camping or hiking, perhaps as a result of their current age and lack of independence as minors. That the experience and memories of it directly inspired new outdoor recreation interests was clear.

North Cascades Institute: Inspiring Environmental Stewardship

One of the stated goals of the North Cascades Institute is to inspire stewardship, and, therefore, learning conservation behaviors is a more explicit part of the program than at the Teton Science Schools (where the emphasis is on science). When participants were asked if there was something they experienced in the program and are still using today, some mentioned specific behaviors learned that they continue to engage in (see Figure 2). Interestingly, many of the inspired actions are indeed environmentally responsible behaviors but not ones directly related to conservation of natural places such as the North Cascades. This could reflect the types of behaviors taught explicitly through the program or that some personal behaviors are clearer and more readily applied at home than others.

Figure 2. Examples of environmentally responsible behaviors inspired by participation the North Cascades Institute's Mountain School program.

Oh! Like not running the water while I'm brushing my teeth. [K: You learned that there?] Yeah. They taught us that how it's important not to keep the water running. (NCI 5)

I learned, you know, that we should all do our part and help the environment because there's only so much of it left, you know. That's something that I kind of use today. Like, I'm not a green freak, but I'm kind of paranoid if somebody doesn't recycle and stuff. It kind of bothers me and stuff, and I think a lot of that has to do with Mountain School. (NCI 15)

[I learned] to not waste food because before that I would always serve myself a lot and not even eat like all of it, and with that it kind of helped me be better. (NCI 7)

Because they had the rule of one for soap and paper towels and I still kind of use that. How you're only supposed to use one little thing of soap and one little square of paper towels, which I tried to still do because it's helping. (NCI 9)

I probably would have littered and stuff up there because I was not that smart or something. I don't know. But after that it made me realize that the environment's really pretty and stuff, and you need to respect that and throw away garbage. (NCI 10)

Well, it helps kids learn about the environment. And show that we should preserve it rather than destroy it kind of. Because like a lot of times, the reason why people just destroy trees and stuff is because they don't know enough about it, so I think it is useful. So I liked it.... Like it really got me to get to know the world a little more and maybe science. (NCI 1)

Teton Science Schools: Knowledge Retained and Used

Participants from the Teton Science Schools gained knowledge in a variety of areas and have applied it to their daily life, their recreational pursuits, and their work. The snow science lesson taught during the seventh grade trip was particularly applicable since these students spend many months living and recreating in cold snowy Jackson Hole.

Yeah, that's the one thing that was cool was just going out there, I learned stuff like about the snow stuff because I had just started skiing and stuff so learning about the snow, avalanche, what type of snow would cause an avalanche was interesting and I found that I was able to apply that if I go up on the resort and ski and stuff...I don't like go out there

and test the snow and stuff, but like if I needed to I could go out there and see the snow layers. (TSS 23)

I guess when we learned about the types of snow I still use that because I have to go feed my horse and walk through all this snow. Know which snow is harder, which snow I won't fall through. (TSS 31)

In some cases, the knowledge gained was directly applicable. One participant described the program as:

Very educational and easy to learn about the nature of our wilderness out here....: It definitely taught me where to go, where not to go. What to stay away from, poison ivy... And you know, how it affects the animals, everything that we do. Basic stuff like that. (TSS 20)

Natural history knowledge gained during the fifth grade (fall season) trip was also useful to some. It provided awareness of one's surroundings and encouraged appreciation as expressed in the quote, "if I hadn't gone there, I don't know if I would like to be outside, like to go do a bunch of outside stuff because I wouldn't be all that interested and wouldn't know what everything was about" (TSS 4).

Although outdoor recreation was a familiar and common experience for many of the students, studying natural history was not. Students appreciated this particular outdoor opportunity saying, "I saw things that you don't normally see if you're in a town or in a city. I heard the birds all the time. I saw animals, like we saw deer out on the trail. Just a really cool experience, personally for me" (TSS 39), and "I definitely learned a lot. Like I was saying, from the people who know it the best. Even little facts that I remember about things, the sunscreen on the aspen trees and stuff" (TSS 34).

Teton Science Schools: Inspiring Outdoor Recreation and Environmental Stewardship

While not as common a response, some students did credit their experience and related memories at the Teton Science Schools with inspiring greater enthusiasm for environmental stewardship. For some, the trips reinforced prior interests by increasing their knowledge or exposure. With regard to environmental stewardship, one student explained,

Well they [the trips] really showed me how much of an environmentalist I am. That I didn't really realize until then...Like I've always been into recycling and saving the animals and what not, and they just showed us the more scientific aspect of it so that was really cool. I didn't expect that either of the times that I went, but I think they were really important. Especially when you live in the National Parks, right there, and it totally shows you what's going on. That was really cool. (TSS 10)

Echoing the emphasis on learning about and caring for the local landscape, another student explained, “environmental awareness, for sure. It made me realize how many things were actually out there. How special it really is. Like the pollution in the rivers, like stuff like that. Made me care about animals more, or wildlife, everything” (TSS 35).

Only two students stated that their Teton Science Schools experience inspired greater participation in outdoor recreation. In both cases, interest in the outdoors was not new but rather enhanced by the experience. These results likely reflect a ceiling effect. Snowshoeing and studying natural history were noted as unusual experiences, but many of the students were already participating in outdoor recreation activities. If they were not, it was usually by choice rather than due to lack of exposure or opportunity.

Directive Function: Social Skills

Students participate in a ROEE experience with their peers, and for some, this social component is as influential as the natural setting and the EE instruction. As one student pointed out, “when you're camping with somebody in the same tent you get to know them more” (NCI

17). Participants, particularly those from the North Cascades Institute, spoke of learning to work with others, making new friends, and becoming more outgoing as a direct result of the program. We classify this as a *directive* function because memories of social interaction at the program are directing future actions and interactions. As one student explained,

...you get to know the students better because you're in groups not just with your friends. You get to know other people. I was with people I didn't know at the beginning, so now I still talk to them to this day because I still remember that I slept with them in the tent (NCI 2).

For quieter students, the ROEE experience was a chance to become comfortable with their classmates. Camping and learning together also enabled students to look beyond superficial differences, especially when assigned to the same tent or learning group. A student who was pleasantly surprised and felt a lasting impact explained,

I think it had more of an impact on me socially. Just because I'm used to hunting and camping and stuff. Because it really shows that we can all get along. I kind of expected the trip to be a little bit weird with people who were kind of in their own cliques already, and we all, we all really did get along. It was all like we were on the same level, and I think now I'm kind of able to see things from the other side a little bit. (NCI 15)

The social skills could even be readily applied back at school, as one student stated when asked how she has used her learning,

Well, like working together, you do that all the time in school. In projects that sometimes you have to do with partners. Or in science in the lab activities we have to work with others and listen to other ideas. Just working with people (NCI 6).

While social skills may not have been the curricular emphasis of the ROEE program, it is clear that they were gained, recalled, and subsequently used, as articulated in the following quote:

I think I'll probably remember it for the rest of my life, and it was a really good experience getting...it was a really good idea having all the kids go out there. I learned a lot and learned other things I'm sure socially, having to live with other people (TSS 25).

Social Function

Autobiographical episodic memories serve a social function when an individual shares these memories with others in conversation. The memories are not directing social skills but rather serving as the basis of the social interaction.

Reminiscing with Friends

Reminiscing with friends about the ROEE experience was a common use of memories among participants from both research sites. Such conversations often occurred in the context of reminiscing about fun times in elementary school. As one participant explained, “[The program] comes up actually a lot. I don’t know. I think it is like something that we remember when we talk about elementary school. That’s the number one thing we talk about” (NCI 5). Sometimes reminiscing is spontaneous as explained by the quote, “just talking to kids in class, and I’m like, oh I remember Mountain School? You know. And then it kind of brings back memories and then we feed off of each other’s ideas” (NCI 4). This comment also reveals the role social interaction plays in reinforcing memories and encouraging their access. As some participants noted, reminiscing requires contact with others who attended the program. Despite the relative stability of their home communities, changing social circles was a potential constraint to reminiscing, which was overcome by some participants but not by others. One participant explained, “I’m friends with different people now. The friends that I went with actually moved away a couple years after we went” (TSS 39), while another participant stated, “some of [my friends] didn’t even go to it, and I have to find the ones that I went to [elementary] school with to talk about it sometimes. And my friends will be like, okay” (NCI 7).

The data do not reveal a great deal about the actual content of conversations between past program participants, but certainly some of the reminiscing revolves around social interactions and student escapades rather than science instruction. One interviewee explained, “When we’re talking about funny stuff sometimes, we’ll think back to some of the funny stuff that we did [there]... yeah, it’s pretty memorable...so we talk about it”(TSS 23). Such comments underscore the importance of creating memories specifically tied to the setting and curriculum. They also reflect the central role social interaction plays in ROEE experiences and suggest that the bonds formed between participants are long-lasting and enjoyable.

Sharing with Non-Participants

While most social reminiscing about the ROEE experience occurred between individuals who had experienced it together, a few participants also spoke of sharing their memories with outsiders. Students who attend the North Cascades Institute shared their experiences to encourage family members and younger students to participate. One girl explained, “my [older] brother didn’t go. My mom only let me because I really wanted to go. I told them it was really fun, and so the next time they let my little brother, so he went” (NCI 2). Other students spoke of hearing others’ memories, saying, “well, I had talked to the people who were older than me, the sixth graders and they said it was a lot of fun” (NCI 9), and “it’s something that I think that most kids look forward to. Like, sixth graders tell fifth graders, it’s awesome” (NCI 7).

Some of the past participants from the Teton Science Schools were already working in the tourism and outdoor recreation industry and described sharing information learned during ROEE experience with clients they encounter in their jobs. As one student explained,

I remember learning about the communities a lot, and I think about that when I’m in them. Like the riparian communities and the conifers and stuff like that. And I still use

the information that I learned from trees. Like when I go in the forest, and I work on a dude ranch, so I use a lot of the information that I learned there, and I tell that to the guests that come there. And I help them, like teach them stuff about everything. So that's how I've use it a lot. (TSS 25)

Whether participants are going home and sharing their experiences and knowledge with family members, schoolmates, or tourists, this social reminiscing with non-participants is valuable as a mechanism to spread enthusiasm for ROEE and environmental awareness.

Self Function

Participants at both research sites described their ROEE experiences as the source of positive memories: “It was fun when I was there and it was a good memory” (TSS 13). In some cases, the experience stands out among others, as evidenced by the comments, “When I think back about elementary school that's just like one of the things that I think about” (NCI 3) and “I went to [the program] in 5th grade. That was the best part, I think, of elementary school” (2). While fun and memories of fun may not be a primary goals of the program, such comments reflect a positive view of ROEE and how these experiences enrich children's lives in the short and long term. As one participant explained,

I think it makes for good memories ...when you think back on it. But I don't know if it really helped me to see life differently or anything because I mean I've always done stuff outdoors and whatnot. But it was fun, you know, and I enjoyed it doing it when I did (TSS 30).

DISCUSSION

Our data reveal that memories of ROEE experiences can and do serve directive, social, and self functions post-program. Similar themes emerged from the data at both research sites, and these themes fit within the larger framework of autobiographical memory function. Such

evidence of memory use builds on previous EE memory research conducted by Knapp and Benton (2006), who demonstrated that students recall information learned, actions taken, and emotions experienced during a ROEE experience. Our work reveals that similar episodic autobiographical memories can serve a variety of personal, social, and behavioral functions, thus adding value to collecting episodic memories as evaluative data. Not only are memories conveniently tied to events and therefore appropriate for follow-up studies, memories are also one of the mediums through which the experience can continue to have an impact.

However, as qualitative researchers, our aim was not merely to confirm that this conceptual framework was applicable to ROEE. Rather, we were interested in how it was manifested in specific settings and how individual program participants recalled and used their experiences.

Directive memories from the North Cascades Institute reflected program goals related to conservation and recreation, which are consistent with the organization's mission. The fact that numerous interviewees described specific environmentally responsible behaviors inspired by the ROEE experience is encouraging given that many conservation organizations continue to struggle to employ education as a viable means to achieving their mission (Heimlich, 2010). In contrast, the Teton Science Schools' mission focuses on teaching about the ecology of the national park. Here, whereas few respondents spoke of the Teton Science Schools experience inspiring outdoor recreation or environmentally responsible behaviors, most spoke of scientific information learned and recalled. They also tended to remember their trip when in similar situations and to use what they learned there to appreciate and understand their home environment. This more place-based use raises the possibility of a fourth memory function: instilling a sense of place (cf. Stedman, 2002). The absence of this memory function in the

psychology literature is interesting in light of the current emphasis in EE on place and place based learning. In a study of how European American and Chinese college students use their autobiographical memories, Kulkofsky, Wang, and Hou (2010) noted that many of the respondents seemed to recall experiences and information for no other reason than that they were in a similar setting, thus suggesting that the three memory functions discussed in the literature are not exhaustive. Exploring the interaction between place, episodic memory, and memory function may be an area in which EE, with its particular interest in place based learning, can contribute to the larger body of research on autobiographical memory function.

Social reminiscing such as occurred among TSS and NCI participants is in keeping with research on memory use that describes two social functions: maintaining intimacy through shared experiences and sharing prior experiences to help others know you (Alea & Bluck, 2003). In this study, much of the material recalled and shared with friends revolved around the social aspects of the program rather than the educational aspects. Programs may want to consider how they can tie learning and EE goals to peer interactions.

At both the North Cascades Institute and the Teton Science Schools, memories served a self function by allowing high school-aged students to store and recall a positive experience from elementary school, but did not reflect the two primary self uses of autobiographical memories in the psychology literature, i.e., to reflect on continuity in one's life and document progress toward one's goals (Bluck et al., 2005; Conway, 2002). Possible explanations for the lack of previously documented self uses of memories in ROEE may be due to differences in individuals, experiences, or social norms. Our interviewees were high school students, while the psychology studies on memory function focus on adults. It is possible that teens have not yet had cause to consider in detail the continuity of their lives or progress toward life goals. Alternatively, the

ROEE experiences may not directly address students' goals. Lastly, social norms may not include environmental awareness and behavior as part of life goals.

Previous studies of ROEE experiences have documented some increases in environmental knowledge, attitudes, and behaviors immediately or shortly after the program (Bogner, 1998b; Johnson & Manoli, 2008, Smith-Sebasto & Semaru, 2004; Stern, Powell, & Ardoin, 2008). Our study also suggests impacts in all three areas, although not necessarily all three in all individuals. By focusing on memory, we were able to add to our understanding of how such impacts may occur and be sustained. The traditional outcomes of knowledge, attitudes, and behaviors are most closely aligned with the directive uses of autobiographical memories. They do not capture self or social uses of such experiences, yet it is clear from our research that ROEE programs are also giving participants positive memories to enjoy alone and in a group. Perhaps more importantly, our study offers insight into *how* an experience continues to influence individuals for years to come. Our research reveals that at least some of the influence comes in the form of use of episodic autobiographical memories tied directly to the ROEE experience.

CONCLUSION

This research has gathered the views of past participants on when and for what purpose they use their memories of a ROEE experience. It has also used the framework put forth by memory psychologists to suggest that directive, social, and self memory uses are related to subsequent actions and stated impacts of a ROEE experience, all of which fall into the category of explicit, autobiographical, episodic memories. We are hopeful that this research into memory use offers a new perspective into how ROEE might become more successful in meeting its goal of increasing ecological literacy and inspiring pro-environmental behaviors.

This work suggests the possibility that viewing potential outcomes of an EE experience as serving directive, social, and self functions may enhance our understanding of knowledge, attitudes, and behavior outcomes. Interestingly, these three new categories correspond with many of the broader goals of EE and proposed antecedents of pro-environmental behaviors (Heimlich & Ardoin, 2008; Hungerford & Volk, 1990). The self functions of recalling positive experiences and events that give a sense of continuity to one's life may relate a person's desire to preserve their home environment or a natural space to which they have a strong personal connection. The self function of reviewing situations in which one was successful or met a personal goal may relate to self confidence and a sense of empowerment when pursuing environmental goals. The social functions of relating memories to strengthen social bonds or establish connections with new people may support formation and participation in strong communities that have the potential to collectively enhance their local social and ecological well-being. The directive function of memories is perhaps the most closely related to the desired outcomes of EE. Recalling a directive message or statement, perhaps one made by an environmental educator, could repeatedly influence future actions. Remembering an experience or event that originated a new environmental interest or perspective could lead a participant in a new life direction or career. Similarly, recalling an event that solidified or confirmed a prior interest in the natural world and its protection has the potential to support an individual as he/she pursues a pro-environmental life path.

While our data do not reflect all of these specific uses, the fact that they support the idea that memories of ROEE serve at least some self, social, and directive functions leads to at least two possible research questions to be explored in future studies. First, what types of EE program experiences might lead to not only strong memories but also lasting use of these memories?

Second, how can follow up experiences or community supports foster the self, social, and directive uses of memories? Experimental and descriptive work in psychology has thus far focused on defining the uses of autobiographical episodic memories. Our work has begun to provide examples of the uses of EE memories. Future work needs to look more closely at memory use as a mechanism that explains and predicts how specific experiences result in specific memory uses.

REFERENCES

- Alea, N., & Bluck, S. (2003). Why are you telling me that? A conceptual model of the social function of autobiographical memory. *Memory, 11*(2), 165-178.
doi:10.1080/09658210244000342
- Auerbach, C. F., & Silverstein, L. B. (2003). *Qualitative data: An introduction to coding and analysis*. New York: New York University Press.
- Baddeley, A. D. (1988). But what the hell is it for? In M. M. Gruneberg, P. E. Morris, & R. N. Sykes (Eds.), *Practical aspects of memory: Current research and issues* (Vol. 1: Memory in everyday life, pp. 3-18). Chichester, UK: John Wiley.
- Baddeley, A. (2001). The concept of episodic memory. *Philosophical Transactions: Biological Science, 356*(1413), 1345-1350. doi:10.1098/rstb.2001.0957
- Baddeley, A., Eysenck, M. W., & Anderson, M. C. (2009). *Memory*. New York: Psychology Press.
- Ballantyne, R., & Packer, J. (2006). Promoting learning for sustainability: Principals' perceptions of the role of outdoor and environmental education centers. *Australian Journal of Environmental Education, 22*(1), 15-29.

- Barnett, S. M., & Ceci, S. J. (2002). When and where do we apply what we learn? A taxonomy for far transfer. *Psychological Bulletin*, *128*(4), 612-637. doi:10.1037//0033-2909.128.4.612
- Bogner, F. X. (1998a). Environmental perceptions of Irish and Bavarian pupils: An empirical study. *The Environmentalist*, *18*, 27-38.
- Bogner, F. X. (1998b). The influence of outdoor ecology education on long-term variables of environmental perspective. *Journal of Environmental Education*, *29*(4), 17-29.
- Bogner, F. X. (2002). Influence of a residential outdoor education programme to pupil's environmental perception. *European Journal of Psychology of Education*, *17*(1), 19-34.
- Bogner, F. X., & Wiseman, M. (1999). Toward measuring adolescent environmental perception. *European Psychologist*, *4*(3), 139-151.
- Bogner, F. X., & Wiseman, M. (2004). Outdoor ecology education and pupils' environmental perception in preservation and utilization. *Science Education International*, *15*(1), 27-48.
- Bluck, S. (2009). Introduction: Baddeley revisited: The functional approach to autobiographical memory. *Applied Cognitive Psychology*, *23*, 1050-1058. doi:10.1002/acp.1609
- Bluck, S., & Alea, N. (2002). Exploring the functions of autobiographical memory: Why do I remember the autumn? In J. D. Webster & B. K. Haight (Eds.), *Critical Advances in Reminiscence: From Theory to Application* (pp. 61-75). New York: Springer.
- Bluck, S., Alea, N., Habermas, T., & Rubin, D. C. (2005). A TALE of three functions: The self-reported uses of autobiographical memory. *Social Cognition*, *23*(1), 91-117.
- Brody, M. (2005). Learning in nature. *Environmental Education Research*, *11*(5), 603-621. doi:10.1080/13504620500169809

- Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative analysis*. London: Sage.
- Chawla, L. (1998a). Research methods to investigate significant life experiences: Review and recommendations. *Environmental Education Research*, 4(4), 383-397.
- Chawla, L. (1998b). Significant life experiences revisited: A review of research on sources of environmental sensitivity. *Environmental Education Research*, 4(4), 369-382.
- Chawla, L. (2007). Childhood experiences associated with care of the natural world: A theoretical framework for empirical results [Electronic Version]. *Children, Youth and Environments*, 17, 144-170. Retrieved from <http://www.colorado.edu/journals/cye>.
- Conway, M. A. (2002). Sensory-perceptual episodic memory and its context: Autobiographical memory. In A. Baddeley, M. A. Conway, & J. Aggleton (Eds.), *Episodic memory: New directions in research* (pp. 53-70). Oxford, UK: Oxford.
- Conway, M. A. (2009). Episodic memories. *Neuropsychologia*, 47, 2305-2313.
doi:10.1016/j.neuropsychologia.2009.02.003
- Denzin, N. K., & Lincoln, Y. S. (2005). Introduction. In N. K. Denzin & Y. S. Lincoln (Eds.), *The Sage handbook of qualitative research* (3rd ed., pp. 1-32). Thousand Oaks, CA: Sage.
- Eells, E. (1986). *Eleanor Eells' history of organized camping: The first 100 years*. Martinsville, IN: American Camping Association.
- Eisenhardt, K. M. (1999). Building theories from case study research. In A. Bryman & R. G. Burgess (Eds.), *Qualitative Research* (Vol. 1, pp. 135-159). London: Sage.

- Farmer, J., Knapp, D., & Benton, G. M. (2007). An elementary school environmental education field trip: long-term effects on ecological and environmental knowledge and attitude development. *Journal of Environmental Education, 38*(3), 33-42.
- Gass, M. A. (1999). Transfer of learning in adventure education. In J. C. Miles & S. Priest (Eds.), *Adventure programming* (pp. 227-234). State College, PA: Venture.
- Gralton, A., Sinclair, M., & Purnell, K. (2004). Changes in attitudes, beliefs, and behavior: A critical review of research into the impacts of environmental education initiatives. *Australian Journal of Environmental Education, 20*(2), 41-52.
- Hammerman, W. M. (Ed.). (1980). *Fifty-years of resident outdoor education: 1930-1980: Its impact on American education*. Martinsville, IN: American Camping Association.
- Heimlich, J. E. (2010). Environmental education evaluation: Reinterpreting education as a strategy for meeting mission. *Evaluation and Program Planning, 33*, 180-185.
doi:10.1016/j.evalprogplan.2009.07.009
- Heimlich, J. E., & Ardoin, N. M. (2008). Understanding behavior to understand behavior change: A literature review. *Environmental Education Research, 14*(3), 215 - 237.
doi:10.1080/13504620802148881
- Holstein, J. A., & Gubrium, J. F. (1999). Active interviewing. In A. Bryman & R. G. Burgess (Eds.), *Qualitative research* (Vol. 2, pp. 105-121). London: Sage.
- Hungerford, H. R., & Volk, T. L. (1990). Changing learner behavior through environmental education. *Journal of Environmental Education, 21*(3), 8-22.
- James, J. J., Bixler, R. D., & Vadala, C. (2010). From play in nature, to recreation then vocation: A developmental model for natural history-oriented environmental professionals.

- Children, Youth and Environments*, 20, 231-256. Retrieved from <http://www.colorado.edu/journals/cye>.
- Johnson, B., & Manoli, C. C. (2008). Using Bogner and Wiseman's Model of Ecological Values to measure the impact of an earth education programme on children's environmental perceptions. *Environmental Education Research*, 14(2), 115-127.
doi:10.1080/13504620801951673
- Johnson, B., & Manoli, C. C. (2011). The 2-MEV Scale in the United States: A measure of children's environmental attitudes based on the Theory of Ecological Attitude. *Journal of Environmental Education*, 42(2), 84-97. doi:10.1080/00958964.2010.503716
- Kerlinger, F. N., & Lee, H. B. (2000). *Foundations of behavioral research* (4th ed.). Toronto, Canada: Wadsworth Thomson Learning.
- Kihlstrom, J. F. (2009). 'So that we might have roses in December': The functions of autobiographical memory. *Applied Cognitive Psychology*, 23, 1179-1192.
doi:10.1002/acp.1618
- Knapp, D. (2006). The development of semantic memories through interpretation. *Journal of Interpretation Research*, 11(2), 21-35.
- Knapp, D. (2007). *Applied interpretation: Putting research into practice*. Fort Collins, CO: InterpPress.
- Knapp, D., & Benton, G. M. (2006). Episodic and semantic memories of a residential environmental education program. *Environmental Education Research*, 12(2), 165-177.
doi:10.1080/13504620600688906

- Kopelman, M. D., & Kapur, N. (2001). The loss of episodic memories in retrograde amnesia: single-case and group studies. *Philosophical Transactions: Biological Science*, 356, 1409-1421. doi: 10.1098/rstb.2001.0942
- Kulkofsky, S., Wang, Q., & Hou, Y. (2010). Why I remember that: The influence of contextual factors on beliefs about everyday memory. *Memory and Cognition*, 38(4), 461-473. doi:10.3758/MC.38.4.461
- Leeming, F. C., Dwyer, W. O., Porter, B. E., & Cobern, M. K. (1993). Outcome research in environmental education: A critical review. *Journal of Environmental Education*, 24(4), 8-21.
- Liddicoat, K. (2012). *Memories and lasting impacts of residential outdoor environmental education programs*. Unpublished doctoral dissertation, Cornell University, Ithaca, NY.
- Liddicoat, K., & Krasny, M. (in press). Assessing environmental education's lasting impact. In J. Dillon, M. Brody, R. Stevenson, & A. Wals (Eds.), *International Handbook of Research on Environmental Education*. AERA, Routledge.
- Liddicoat, K., Rogers, J., & Anderson, L. (2006). Inclusion at Residential Outdoor Environmental Education Centers: A Survey of Current Practices. *Research in Outdoor Education*, 8, 119-127.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic Inquiry*. Beverly Hills, CA: Sage.
- Lodico, M. G., Spaulding, D. T., & Voegtle, K. H. (2010). *Methods in educational research: From theory to practice* (2nd ed.). San Francisco: Jossey-Bass.
- Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. San Francisco: Jossey-Bass.

- Neisser, U. (1982). *Memory observed: Remembering in natural contexts*. New York: W. H. Freeman.
- North American Association for Environmental Education (NAAEE). (2009). *Nonformal environmental education programs: Guidelines for excellence*. Washington, DC: NAAEE.
- Pillemer, D. B. (1998). *Momentous events, vivid memories*. Cambridge, MA: Harvard University Press.
- Pillemer, D. B. (2001). How memories of school experience can enrich educational evaluations. *New directions for evaluation, 90*, 69-82.
- Rasmussen, A. S., & Berntsen, D. (2009). Emotional valence and the functions of autobiographical memories: Positive and negative memories serve different functions. *Memory and Cognition, 37*(4), 477-492. doi:10.3758/MC.37.4.477
- Rubin, H. J., & Rubin, I. S. (1995). *Qualitative interviewing: The art of hearing data*. Thousand Oaks, CA: Sage.
- Saldana, J. (2009). *The coding manual for qualitative researchers*. London: Sage.
- Smith-Sebasto, N. J., & Cavern, L. (2006). Effects of pre- and posttrip activities associated with a residential environmental education experience on students' attitudes toward the environment. *Journal of Environmental Education, 37*(4), 3-17.
- Smith-Sebasto, N. J., & Semrau, H. J. (2004). Evaluation of the environmental education program at the New Jersey School of Conservation. *Journal of Environmental Education, 36*(1), 3-18.
- Stake, R. E. (2005). Qualitative case studies. In N. K. Denzin & Y. S. Lincoln (Eds.), *The Sage handbook of qualitative research* (3rd ed., pp. 443-464). Thousand Oaks, CA: Sage.

- Stern, M. J., Powell, R. B., & Ardoin, N. M. (2008). What difference does it make? Assessing outcomes from participation in a residential environmental education program. *Journal of Environmental Education, 39*(4), 31-43.
- Stedman, R. C. (2002). Toward a social psychology of place: Predicting behavior from place-based cognitions, attitude, and identity. *Environment and Behavior, 34*(5), 561-581.
doi:10.1177/0013916502034005001
- Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (2nd ed.). Thousand Oaks, CA: Sage.
- Thompson, C. P., Herrmann, D. J., Bruce, D., Read, J. D., Payne, D. G., & Toglia, M. P. (1998). *Autobiographical memory: Theoretical and applied perspectives*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Tulving, E. (2002). Episodic memory: From mind to brain. *Annual Review of Psychology, 53*, 1-25.
- Williams, H. L., & Conway, M. A. (2009). Networks of autobiographical memories. In P. Boyer & J. V. Wertsch (Eds.), *Memory in mind and culture* (pp. 33-61). New York: Cambridge University Press.
- Williams, M. (2002). Generalization in interpretive research. In T. May (Ed.), *Qualitative research in action* (pp. 125-143). London: Sage.
- Yin, R. K. (2006). Case study methods. In J. L. Green, G. Camili, P. B. Elmore, A. Skukauskaite & E. Grace (Eds.), *Handbook of complementary methods in education research* (pp. 111-122). Mahwah, NJ: Lawrence Erlbaum.
- Zelezny, L. C. (1999). Educational interventions that improve environmental behaviors: A meta-analysis. *Journal of Environmental Education, 31*(1), 5-14.

CHAPTER 5

CONCLUSION

The overarching goal of this dissertation is to provide insight into the lasting impact of residential outdoor environmental education (ROEE) on participants. The first article reviews literature documenting the connection between outdoor experiences in childhood and adult environmental attitudes and behaviors, as well as summarizing relevant long-term evaluations of outdoor and environmental education programs. The second article presents original research on what participants *remember* many years after a ROEE experience. This research builds on prior work in interpretation (Knapp, 2007), but significantly increases the length of time (from one year to up to 45 years) between the experience and the data collection. The third article explores how individuals *use* the memories they create and store from a ROEE experience, applying a new body of theory on memory use to outdoor environmental education.

MAKING CONNECTIONS

Significant Life Experiences Literature and Episodic Memory Studies

Although on the surface, my research may be more similar to program evaluations of ROEE such as those conducted by Bogner (1998, 2002), Johnson and Manoli (2008, 2011), and Stern, Powell, and Ardoin (2008), there are also many intersections between my studies and the Significant Life Experiences (SLE) literature. The methods are notably similar, using qualitative retrospective interviews and narratives to explore possible connections between childhood experiences and subsequent attitudes and behaviors. Although collection of memories was not the primary goal of SLE researchers, their data are in fact autobiographical episodic memories of influential events in childhood (Chawla, 1998). SLE researchers did not test generalized

knowledge (semantic memory) gained during childhood, nor did they explore what experiences might have influenced adult attitudes and behaviors but are no longer explicitly recalled. The researchers focused on remembered significant life experiences. It would be interesting to re-examine the multitude of SLE data in relation to the episodic memory theories discussed in this dissertation. Perhaps there are certain characteristics of influential events that went unnoticed but are necessary to recognize if we are to replicate the experiences (and more importantly their influence) for current youth.

Two critiques leveled at the SLE research also seem particularly relevant to my research. A. Gough (1999) proposes that children are different today and, therefore, knowing what influenced their parents is not helpful. My studies countered this critique by gathering data from teens as well as adults. All of the results reported from the North Cascades Institute and the Teton Science Schools were from interviews with teens. The results reported in this dissertation from Bradford Woods were from adults, but I also collected open-ended survey data from teens who had attended the program just seven years earlier and found that their answers were very similar to those provided by my adult interviewees.

Perhaps more interesting is to pair A. Gough's (1999) question about relevance today with another critique, by N. Gough (1999), that our histories should be surpassed not repeated. It is through critically reflecting on one's autobiographical memories and experiences, that education can move forward. Extending this argument to my research, I think it is important to recognize that documenting the successes and failures of past programs is only helpful if the insights gained can be reasonably and appropriately applied to current and future programs. Whether or not current children actually like different things and behave differently today than in the past, they certainly inhabit a natural, political, social, and economic world that is different

from 40 years ago. This world will continue to change throughout their lifetimes. My research may have documented the effectiveness of the Rainbow Trail and camping in tents in teaching local species of trees and inspiring outdoor recreation, but that does not mean that all ROEE or EE programs should begin handing out colored yarns, focus exclusively on species identification, and tear down their buildings. My research is valuable because it explores what *characteristics* of these experiences made them memorable, such as physical activity and novelty. Such characteristics are transferable to new programs, new settings, and new populations.

Memories, Memory Uses, and Program Impacts

I chose autobiographical episodic memories and their uses as my data for a variety of reasons which are described in this dissertation. Although episodic memories can be (and are) influenced by subsequent life experiences, they are by definition memories that are still tied to the original event in one's mind. Their memory counterpart, semantic memory, is general knowledge no longer connected to the context in which it was learned. Episodic memories are consciously known and can be explicitly shared (Baddeley, Eysenck, & Anderson, 2009). They are also less likely to be the result of unknown intervening experiences than generalized knowledge, attitudes, and behaviors when measured years after a ROEE program. It is important to recognize, though, that while one of the descriptors of episodic memories is that they allow mental time travel (Tulving, 2002), psychological and neurological research has shown that memories do not always capture experiences perfectly. The processes by which memories are stored and reconstructed and the extensive literature on false memories, much of it related to child abuse and court proceedings, were beyond the scope of this dissertation, which focused on environmental education. My perception is that most of the memories shared by my interviewees

were accurate because there was concurrence between interviewees, and the stories from past participants matched information shared by former teachers. I was not able to test for accuracy because I was not present for the original programs, one shortcoming of this research method. Chawla (1998) suggests that (SLE) research on the meaning and use of memories will provide more interesting and valuable insights than studies narrowly focused on the veracity of memories. I too would argue that if our main interest as educators is in what students carry with them and are able to use in the future, exact recall may not be so important. For example, does it really matter whether it was your sleeping bag that got wet because you forgot to close the tent flap or your friend's who told you about it and now you think it was yours, if you remember this experience and act appropriately in the future? More methodologically worrisome would be if participants were combining memories from multiple experiences and attributing them and their uses to the ROEE program under investigation. Those types of false memories occurred infrequently and were recognizable because participants were describing details that did not fit with my knowledge of the ROEE program.

My studies encourage researchers and practitioners to consider episodic memories as a desired outcome of EE and to draw on memory theory to enhance EE programs. However, the types of memories and descriptions of use that I gathered through my interviews are only one possible lasting outcome of EE. Episodic memories may become semantic memories (general knowledge) that are no longer connected to the experience, but are still as useful, if not more useful, to the individual than the original episodic memories. Experiences and their memories may also be useful for a while and influence knowledge, attitudes, or behaviors and then be forgotten as the person moves on. Conversely, the individual may have memories for which they have not yet found a use. Lastly, individuals may not always recognize when they are using a

memory. Therefore, it must be made clear that my research uses one approach based in one set of theory that provides one particular collection of insights through a feasible and valid method of collecting data into the yet to be fully answered question, “What impact does ROEE have over a life-time?”

OFFERING RECOMMENDATIONS

As applied research, my studies yield recommendations for both ROEE programs and EE researchers.

To ROEE Programs

The recommendations for practitioners are listed below:

1. Enhance the likelihood of creating lasting episodic memories by designing programs that are active, rewarding, emotionally engaging, distinctive, and applicable at home.

Although we cannot know precisely what knowledge, attitudes, and skills today’s children (tomorrow’s adults) will need to live peacefully and sustainably in a world that is rapidly changing, as educators we must choose certain information to share and skills to foster through our programs. Psychological research suggests ways in which we can make those lessons stick, perhaps for a life-time. We should do our best to make our programs memorable.

The experiences we offer at ROEE centers are inherently episodic events, removed from the everyday lives of participants. We should capitalize on that uniqueness to enhance memory creation and exposure to new landscapes, ideas, and skills. We should also accept that our programs *are* short in length and find ways to connect what the students are learning at our centers to what they are learning in their schools, their families, and their communities. In doing so, we will be encouraging students to recall what they learned, use it to direct their actions, and

build semantic memories in which environmental knowledge is just part of their general knowledge. We will be extending the reach and impact of our work.

2. Make full use of the residential aspect of the program, teaching relevant material through the meal and overnight times.

ROEE is different from nearly all other K-12 educational experiences (with the exception of boarding schools). Students spend the night away from home, in a natural area, with their teachers and other mentors. Yet in my experience, our goals and evaluations focus almost exclusively on what happens on the trail between breakfast and dinner, with the possible inclusion of an evening interpretive program. The meals, the down-time in the cabins or tents, the overnights are either thought of as recreational or simply considered structural components that allow students to spend an extended period studying science in a distant natural area. My research shows that the *residential* component of ROEE is very meaningful to students, especially socially. Study participants spoke of forming close friendships in small tents, developing relationships with caring and charismatic teachers, learning to accept diversity among their peers, and developing social skills that they used in other settings. This type of learning is very relevant to our field because solving current and future environmental problems will likely require successful community and civic engagement in an increasingly global and diverse world. The residential component is what makes ROEE special. We should strive to maximize learning during the entire 24-hour period.

Study participants' enthusiasm for sleeping in tents was interesting and somewhat surprising since most ROEE programs, including those run by my study sites, now involve sleeping in dorms or cabins. How can we achieve similar results in new settings? It seems that

tents allowed for a sense of independence and encouraged bonding with a small group of peers. These benefits can be replicated through other programmatic and structural components. Sleeping in tents may also have given students the opportunity to enjoy unstructured time in nature, a type of experience some have argued is linked to adult pro-environmental attitudes and behaviors (e.g., Chawla, 2007; Louv, 2005). Such opportunities may need to be worked into current programs through daytime activities. Students were also learning from their surroundings. Orr (1994) notes that the school buildings students inhabit can either reinforce or contradict what we teach in EE. Education about water and energy conservation, waste management, and other aspects of green design can be taught through dorm life, making the nights as memorable and worthwhile for students today as they were in the past.

3. Recognize that program design and quality instruction, in addition to the natural setting, influence what students learn and remember.

Differences between the programs studied and the memories created reveal that program emphases and instructional techniques matter. Students from Bradford Woods recalled natural history. Students from the Teton Science Schools recalled ecological knowledge. Students from the North Cascades Institute recalled specific environmental behaviors and views. Similarly, particular activities, especially those that were active, emotionally engaging, and novel, were remembered. Excellent teachers were also remembered. Therefore, what we do as environmental educators does matter, and we should aim to do it well. Children do not just spontaneously learn from the mountains and trees that surround them during a ROEE experience.

While the Rainbow Trail program was specific to a time and a place, the idea of achievement through ROEE is more universal. Competition and recognition may have a role to play in engaging children in EE and in encouraging them to use their memories post-program.

4. Balance traditions and innovation.

Balancing tradition and innovation is challenging for EE and ROEE. On one hand, we wish to inspire in students an appreciation of cultural and natural history and an understanding of time on a geologic or ecological scale. We also draw on cultural traditions such as telling stories and singing songs around the campfire in developing our programs. At the same time, we want our lessons to address emerging and dynamic environmental challenges and to prepare students to respond to those not yet foreseen. We want to use new and innovative educational techniques and often employ young educators with limited awareness of prior programs and few connections with participating school districts. I myself fit that description as an instructor at Bradford Woods who had only a vague sense of the Rainbow Trail program eliminated three years earlier.

My research taught me at least two related things as a practitioner. First, it reminded me that while innovation is important, ROEE is not a new endeavor, and we would do well to learn what we can from the talented educators who went before us. Perhaps more surprising to me, was the realization that by maintaining a consistent program for 40 years, Bradford Woods and the sponsoring school district unwittingly enhanced student engagement and recall. Students looked forward to the fifth-grade trip, were motivated by social pressure to learn material and earn ribbons, and were reminded of their experience as one shared by the whole community. In

this case, the community provided pre- and post-trip reinforcement without any effort on the part of Bradford Woods, something other ROEE centers might want to consider.

To Researchers

The research presented in this dissertation also yields some recommendations for future research and researchers:

1. Psychological research on memory use is still very new, and my study presents but one attempt to apply such theory to ROEE. Additional research is needed in EE as the concept of memory use becomes more defined.
2. While semi-structured interviews may yield the richest data because reminiscing generally occurs in conversation, this method may not be conducive to widespread use by practitioners. The data collection and analysis requires significant time and skill. Development of a close-ended questionnaire to gather similar information could be a valuable contribution to EE and ROEE.
3. Longitudinal studies, those that assess participants at the time of the program and for years to come, are needed to address some of the questions left unanswered by my research regarding the accuracy of memories and changes over time. Such studies are time consuming and challenging but may be feasible for stable programs such as those I studied.
4. This research looked at one specific type of EE. New studies could explore memories of EE programs in different settings, with different curricular foci, and with participants from different ages and backgrounds.

Personal Reflections on Conducting Memory Research

When I began my research at Bradford Woods, the entire idea of conducting retrospective interviews about a three-day trip in fifth grade up to 45 years later seemed rather far-fetched. I knew from casual conversations with supermarket cashiers and taxi drivers that local residents liked to spontaneously reminisce about Bradford Woods when I mentioned that I worked there or happened to be wearing my staff shirt. I knew that many of the teachers who brought their students to Bradford Woods could tell stories from years ago. Current Bradford Woods staff jokingly told me I should just stand in the town square wearing a sandwich board to recruit my interviewees because the whole town had gone to Bradford Woods. Still, I wondered whether I would really be able to find enough people who were willing to talk to me and whether they would really remember enough to make the research worthwhile. As far as I knew, no one else had tried this. It turned out that the research was entirely possible, and the data were richer than I could have imagined. Residents signed up at local events; interviewees gave me their friends' names and phone numbers; people responded to cold calls by agreeing to meet me at Starbucks, the library, or their house to reminisce about fifth grade; the Chamber of Commerce sent a message to local businesses prompting a flurry of responses and volunteers; and by the end people started saying to me, "Oh, *you're* the one doing the study." When we met for interviews, I was astonished by people reciting campfire rhymes, naming tentmates, telling me the species of trees they learned, demonstrating how to measure a tree by holding up their thumb and squinting at it, telling me that they still had their rainbow badge, and relating how they were now passing on what they had learned to their children. At the conclusion of my study, it was very rewarding to be able to share what I had learned with former teachers and program participants in a

community event that made the front page of the local newspaper. As a former Bradford Woods instructor myself, I thoroughly enjoyed the research from beginning to end.

Interviewing teens in-person at their high school, as I did at my other two sites, was in some ways simpler because they were a semi-captive audience. But in other ways it was harder because teens forget appointments and tend to be laconic when interviewed during first period. However, they were still surprisingly generous with their thoughts and memories and detailed in the information they related. As a result, after conducting 100+ retrospective interviews, I would encourage agencies and practitioners to consider this type of evaluation. Participants do remember our programs, have views on the impact of the experiences, and we *can* follow up with them.

REFERENCES

- Baddeley, A., Eysenck, M. W., & Anderson, M. C. (2009). *Memory*. New York: Psychology Press.
- Bogner, F. X. (1998). The influence of outdoor ecology education on long-term variables of environmental perspective. *Journal of Environmental Education*, 29(4), 17-29.
- Bogner, F. X. (2002). Influence of a residential outdoor education programme to pupil's environmental perception. *European Journal of Psychology of Education*, 17(1), 19-34.
- Chawla, L. (1998). Research methods to investigate significant life experiences: review and recommendations. *Environmental Education Research*, 4(4), 383-397.
- Chawla, L. (2007). Childhood experiences associated with care of the natural world: A theoretical framework for empirical results [Electronic Version]. *Children, Youth and Environments*, 17, 144-170. Retrieved from <http://www.colorado.edu/journals/cye>.

- Gough, A. (1999). Kids don't like wearing the same jeans as their mums and dad: So whose 'life' should be in significant life experiences research? *Environmental Education Research*, 5(4), 383-393.
- Gough, N. (1999). Surpassing our own histories: Autobiographical methods for environmental education. *Environmental Education Research*, 5(4), 407-418.
- Johnson, B., & Manoli, C. C. (2008). Using Bogner and Wiseman's Model of Ecological Values to measure the impact of an earth education programme on children's environmental perceptions. *Environmental Education Research*, 14(2), 115-127.
doi:10.1080/13504620801951673
- Johnson, B., & Manoli, C. C. (2011). The 2-MEV Scale in the United States: A measure of children's environmental attitudes based on the Theory of Ecological Attitude. *Journal of Environmental Education*, 42(2), 84-97. doi:10.1080/00958964.2010.503716
- Knapp, D. (2007). *Applied interpretation: Putting research into practice*. Fort Collins, CO: InterpPress.
- Louv, R. (2005). *Last child in the woods: Saving our children from nature-deficit disorder*. Chapel Hill, NC: Algonquin
- Orr, D. W. (1994). *Earth in mind: On education, environment, and the human prospect*. Washington, DC: Island Press.
- Stern, M. J., Powell, R. B., & Ardoin, N. M. (2008). What difference does it make? Assessing outcomes from participation in a residential environmental education program. *Journal of Environmental Education*, 39(4), 31-43.
- Tulving, E. (2002). Episodic memory: From mind to brain. *Annual Review of Psychology*, 53, 1-25.

APPENDIX A: INTERVIEW GUIDES

Bradford Woods

1. I'd like to start off by getting to know a little more about your time at Bradford Woods.
Do you have a story that you could share with me?
2. With which elementary school did you go to Bradford Woods? In approximately what year?
3. Have you been back to Bradford Woods since? For what reason? Do you have any close family members (siblings or children) who have attended environmental education programs at Bradford Woods within the past 10 years?
4. When you recall your fifth/sixth grade experience, what three things first come to mind?
(Ask follow up questions to find out details remembered and reasons why they were memorable.)
5. What specific educational activities do you remember?
6. What do you remember about the overnight or social experience?
7. I am going to ask you about a series of activities that may or may not have been part of your Bradford Woods experience. Please comment on them if you remember them:
 - Panning for gold
 - Hiking
 - Rainbow Trail
 - Wild Edibles
 - Wildflowers
 - Geology
 - Soil

- Tree study
 - Water study
 - History Hike
 - Using a journal
 - Campfire
 - Night hike or experience
 - Sleeping in a tent
 - Tent inspection
 - Living with a PLUS senior
 - Living with your teacher
 - Yuck Bucket or trash separation in the dining hall
 - Singing
 - Other specific memories
8. Can you think of any ways in which your fifth/sixth grade experience influenced your views, actions, or interests shortly after you came home? What about longer-term? Still influencing you?

Thank you for sharing all of these memories of Bradford Woods. If it is okay with you, I would like to switch gears and learn a little more about what you do now.

9. What do you consider your occupation or profession
10. What do you like to do in your free time?
11. Do you belong to any civic or philanthropic organizations? Volunteer in the local community?

12. I have here a list of environmental activities that you may engage in. Please look through it and tell me about any of the ones you do.

Picking up trash or not littering.

Saving water.

Conserving electricity.

Walking or biking to save gas.

Buying recycled or "green" products.

Gardening.

Buying local or organic food.

Belonging to in an environmental organization.

Volunteering with a local park or nature program.

Teaching others about nature or environmental issues.

Reading about nature or environmental issues.

Advocating for environmental practices at your business.

Hunting or fishing.

Birding or other nature study.

Tent camping.

Outdoor recreation (such as hiking, swimming, boating, skiing).

13. How would you describe your environmental views and beliefs?

14. Thank you. I'd just like to finish with one more question about Bradford Woods. If you had to pick something that you experienced there that you would want kids today to experience, what would it be?

15. Thank you. That concludes my questions, but I would be interested in learning anything else you would like to add. You are also quite welcome to ask me any questions at this point.

Thank you for your time! Can you recommend anyone else I should talk to?

North Cascades Institute

1. Would you tell me a story from your trip to Mountain School to give me a glimpse of what it was like?
2. What three things do you remember most from your trip?
3. What academic activities do you remember participating in? What can you tell me about them?
4. What do you remember about the social or camping components of the trip? What can you tell me about them?
5. I have talked to some of your teachers and put together a list of some of the activities at Mountain School. If you remember doing or learning these things, please tell about them. I'm interested in what you remember and how you felt about these things. What can you tell me about...
 - a. Getting ready for Mountain School
 - b. Traveling to the North Cascades
 - c. Arriving and exploring the National Park Visitors Center
 - d. Setting up camp
 - e. Ecosystem ABCs
 - f. Geology

- g. Glaciers
 - h. Each-one-teach-one trees and plants
 - i. Games about trees or animals
 - j. Making a web of life
 - k. Nobody's ever alone in the forest play
 - l. Campfires—skits and songs
 - m. Night walk
 - n. Writing poetry or journaling
 - o. Hiking
 - p. (Native American) Rock Shelter
 - q. Learning about the western red cedar, making twine
 - r. Making a wish at the closing fire
 - s. Living in a tent.
 - t. The weather
 - u. Cooking and eating meals
 - v. Under-a-pound challenge
 - w. Your teachers and chaperones
 - x. The park rangers and program leaders
 - y. Time with friends
 - z. Activities back at school
6. What was your overall reaction to Mountain School? How did you feel when you left?
7. How did it fit with previous experiences? Had you been camping before? Had you been to the NC before? Experiences since then? Have you done those things since then?

8. What do you think is the value of Mountain School?
9. How did you describe your trip to your friends and family when you returned home?
How do you describe it now?
10. What influence, if any, did the experience have on you personally or socially?
11. What influence, if any, did the experience have on your views of nature or environmental issues? On your environmental behaviors? On your views of National Parks?
12. What influence, if any, did the experience have on your academic interests or career plans?
13. To what do you credit these impacts or the lack of impacts?
14. If the experience had an impact on you, was it right after the experience, over the past seven years, or both?
15. How often do you think or talk about your experiences at Mountain School? For what reasons?
16. Can you give me an example of something that you did at Mountain School that you are still doing or using today?
17. To close, I was wondering if you could pick one thing that you experienced at Mountain School that you hope students today will get to experience.
18. Thank you! Do you have any additional comments or memories to share? Any questions for me?

Teton Science Schools

1. How many times have you been to the Teton Science School and for what programs?
When you think about these experiences, is it usually together or separately? I am interested in what you remember of all of them, but the interview will focus on your 5th

and 7th grade trips. To make it easier for me to understand your answers, throughout the interview, please try to identify which experience you are talking about.

2. Just to get us started, would you tell me a story about an experience you had at the Teton Science School?
3. What three things do you remember most from your 5th grade trip? Your 7th grade trip? What lessons do you remember participating in 5th grade? In 7th grade? What can you tell me about them?
4. What do you remember about the social or overnight components of the trip in 5th grade? In 7th grade? What can you tell me about them?
5. I have talked to some of your teachers and put together a list of some of the activities at the Teton Science School. Because each group leader designs their own lessons, you may or may not have done these things. If you did, please tell me what you remember about them
 - a. Getting ready for your trips to the Science School
 - b. Traveling to there
 - c. Arriving and moving in
 - d. How was it different coming back in 7th grade?
 - e. SCAR
 - f. Sage community
 - g. Conifer community
 - h. Aspen community
 - i. Riparian community
 - j. Research question and project

- k. Presenting your project
 - l. Map and compass
 - m. Thicket and other games
 - n. Night walk
 - o. Elk bugling
 - p. Hiking
 - q. Your journal
 - r. Specimens of the day
 - s. Snow ecology
 - t. Snowshoeing, skiing
 - u. Snow pits or caves
 - v. Living in a cabin.
 - w. The weather
 - x. Meals
 - y. Clean up after meals
 - z. Clean up on the last day
 - aa. Your teachers, chaperones, and program leaders
 - bb. Time with friends
 - cc. Activities back at school
6. What was your overall reaction to the Teton Science School the first time? The second time?

7. How did these experiences fit with previous experiences? Fit with each other? Had you been to the Teton National Park before? How did these experiences fit with experiences since then? Have you been back or done similar things?
8. As someone who lives in Jackson Hole, did you feel that you had gone somewhere or that you were right at home at the Science School? How did that influence your experience?
9. How would you describe the value of each of your experiences at the Science School? Do you think one experience is more valuable and why? How do you think one experience influenced the value of the other?
10. What influence, if any, did the experiences have on you personally or socially?
11. What influence, if any, did the experiences have on your views of nature or environmental issues? On your environmental behaviors? On your views of National Parks?
12. What influence, if any, did the experiences have on your academic interests or career plans?
13. Do you think one of your two trips had a greater impact? Why?
14. If the experience had an impact on you, was it right after the experience, over the past five years, or both? How was the impact of your fifth grade experience influenced by your seventh grade experience and vice versa?
15. How often do you think or talk about your experiences at the Science School? For what reasons? With whom?
16. Can you give me an example of something that you did or learned at the Science School that you are still doing or using today?

17. To close, I was wondering if you could pick one thing that you experienced at the Teton Science School that you hope students today will get to experience.

18. Thank you! Do you have any additional comments or memories to share? Any questions for me?