

## **ABSTRACT**

FRAULO, AIMEE BETH. Exploring Outdoor Educators' Positional Identities: Survey Development and Validation Using Structural Equation Modeling in a Mixed Methods Study Blending Quantitative Results with Phenomenological Analysis (Under the direction of Dr. Sarah J. Carrier).

The purpose of this study is to investigate the positional identity of outdoor educators (OE) within educational spaces. Numerous studies have reported the myriad benefits of outdoor learning, but do not address the factors, contexts, and experiences that impact OEs' identity formation and professional trajectory. Through an embedded mixed methods approach, this study utilized structural equation modeling (SEM) to develop and validate a quantitative survey instrument to measure OEs positional identity while concurrently conducting a qualitative phenomenological study to uncover the unheard, authentic voices of OEs regarding their positionality as educators.

The quantitative results were analyzed through a series of ANOVA and regression models. The phenomenological methodology included semi-structured interviews with nine OEs to reveal themes describing OEs positional identities and orientations to their profession. The qualitative data provided substantive meaning and content relevance to the quantitative results.

Results indicate that OEs share similar personal and pedagogical goals of supporting learners' growth and development, yet they have complex and varied approaches to their professional activities. Many described their own memories of the restorative effect of spending time in nature in their childhood. The most significant finding in the present study was the common goal of the OEs to connect others with nature and provide for them similar positive socio-emotional experiences in nature that they remembered from their own childhoods.

The contribution of this study is the development and validation of a new quantitative survey instrument to investigate OE identity. Additionally, it provides representation for this

group of underrecognized educators to reveal identity patterns describing OEs' professional contributions to holistic, intentional whole child learning.

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Exploring Outdoor Educators' Positional Identities: Survey Development and Validation Using  
Structural Equation Modeling in a Mixed Methods Study Blending Quantitative Results with  
Phenomenological Analysis

by  
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## **DEDICATION**

This dissertation is dedicated to:

My Dad who taught me to always be kind and find value and goodness in all things

My Mom who, paraphrasing Winston Churchill (1941), taught me to,

“Never, never, never give up.”

## BIOGRAPHY

Aimee Fraulo spent her childhood in the swamplands behind her house in southern Connecticut where she developed a fascination with social and biological systems. She began her academic career studying sociology, systems theories, and the social perception of the separation between the human and natural spheres. As a university student, she began teaching estuary ecology, conservation, and human impact on the environment to elementary students at a nonprofit environmental organization in her hometown on Long Island Sound. She worked as an educator at several ecological camps and programs in the United States and while living in South Africa.

While living and working on a small marsh island in the Chesapeake Bay where students came for 3-day programs and were ‘immersed in the resources,’ she experienced the power of human’s connection to nature. While living on the marsh and catching their own food, she noticed profound changes in the students. They came thinking mud and crabs were “gross” and left being in love with the Bay. Several of them wrote her letters describing that the experience changed their perception of themselves and their relationship with their environments.

Aimee continued her work connecting students with nature as a Montessori teacher. She frequently took students outside and incorporated ecological thinking and immersion in nature in her lessons. After attending graduate school in agroecology and working as an agricultural research scientist, she continued working with students and connecting them with nature through developing collaborations with schools and community gardens.

Noticing that the students with whom she worked increasingly presented with social and psychological diagnoses as they were becoming alienated from the natural environment inspired her to return to school to study the cognitive and socioemotional effects of nature. Learning

about Kaplan's (1995) Attention Restoration theory (ART) and stress reduction theory (SRT), Kellert and Wilson's (1993) social biological interpretation of Biophilia, Nel Noddings' (2005) work on communities of caring, and the neuroscience research on learning have reinforced her commitment to advocate for and develop outdoor ecologically based programming for students to experience immersion in nature; reconnect with the natural world; and feel the sense of belonging, wellbeing, and empowerment that has been shown to result from interacting with natural environments.

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## CHAPTER 1

### INTRODUCTION

For over a century, education philosophers have promoted the importance of including outdoor experiences in formal classroom learning. Both Dewey and Montessori emphasized nature studies as a fundamental part of child development (Kohlstedt, 2008; Vidales, 2018). Theorists and philosophers as early as Hippocrates in the 5<sup>th</sup>-6<sup>th</sup> century B.C. believed that human health is directly tied to nature (Capaldi, et al., 2014; Ferrini, 2003; Kaplan, 1993). In the 1700's, Benjamin Rush, the father of American psychiatry, stated that "digging in the soil has beneficial effects on mental health" (Ferrini, 2003, p.78). Current research in microbiology supports Rush's observations that soil microbes positively affect human health and well-being by regulating gut microbiota and modulating serotonin levels (Kuo, 2015; Sobko et al., 2020).

The myriad benefits of outdoor learning on children's cognitive and socio-emotional development and its associated barriers, both globally and in the U.S., have been well documented (Berman et al., 2008; Egger et al., 2017; Ernst, 2014; James & Williams, 2017; Kaplan & Berman, 2010; Kubat, 2017; Lavie Alon & Tal, 2017). However, little is known about the educators who support this learning. The identity development and professional orientation of these educators within the educational ecosystem are not well documented and are seldom reported in their own voices. In this study, the term *educational ecosystem* is defined as a system of formal indoor and non/informal outdoor learning spaces that together form an interactive learning and teaching environment. As the term *ecosystem* suggests, it encompasses a network of interactions among multiple social and physical systems. The present study examines the benefits and challenges of outdoor learning within this ecosystem with the outdoor educator (OE) as the central focus.

## **Benefits of Outdoor Learning Environments**

Globally, research has documented the array of benefits gained from outdoor learning experiences. In Spain, Dadvand et al. (2015) evaluated the cognitive development of primary school children comparing local “greenness” through satellite imagery and normalized difference vegetation indices (NDVI). This study found a positive correlation between children’s exposure to green spaces and academic performance. In Scandinavia, a Danish study comparing students exposed to nature to those without exposure found that those with nature exposure demonstrated significantly less stress and increased cognitive functioning (Mygind et al., 2018). In the United States, a study of a garden-based education program using exploratory path analysis found that students’ participation in the school garden positively correlated with their academic motivation and engagement (Skinner & Chi, 2012). Therapeutic studies in the U.S. have reported that patients experienced a decrease in levels of depression, stress responses, and blood pressure when engaged in outdoor activities (Bratman et al., 2012; Shanahan et al., 2016; Ulrich, 1979). Berman et al. (2008) conducted pre- and post-cognitive tests with university students and found a significant increase in attention and performance after the students were exposed to natural environments. Berger (2006) found that students with learning and socio-emotional difficulties developed more confidence, sense of belonging, and communication skills when exposed to outdoor learning environments. Similarly, McCurdy et al. (2010) found that students diagnosed with attention deficit hyperactivity disorder (ADHD), received fewer reports of inattention and impulsive behavior from caregivers after outdoor experiences.

In addition to cognitive and mental health benefits, epidemiological studies of global pandemics such as the recent SARS-CoV-2 (COVID-19) outbreaks suggest that formal classroom education should consider incorporating outdoor learning spaces into their curricula

for its health and safety benefits of the open air, exposure to UV light, and ability to accommodate physical distancing recommendations (Collins et al., 2020; Spiteri, 2020).

### **Barriers to Implementation**

Despite the global recognition of the positive effects of learning in the outdoors, outdoor instruction and the educators who provide outdoor learning experiences are not culturally perceived as being an integral part of educational ecosystems (Barrett, 2005; Spiteri, 2020; Stevenson, 2007). Research indicates that institutional barriers in schools such as lack of administrative and structural support, testing requirements, and lack of professional development opportunities impede integration of outdoor learning opportunities in traditional educational spaces (Harris, 2018; Kubat, 2017; Okur-Berberoglu et al., 2015). In Canada, Ayotte-Beaudet et al. (2017) found that many educational systems do not endorse outdoor learning as part of the curriculum and teachers are not encouraged to use the schoolyard to complement classroom learning. Similarly, in the United Kingdom, MacQuarrie (2018) found in her analysis of school-based programs that outdoor learning is perceived as separate from the curriculum.

Many of the perceived barriers coalesce around preconceptions related to institutional expectations such as appropriate classroom management, the assumptions that outdoor learning lacks rigor, and that learning should be relegated to indoor classroom spaces (Ayotte-Beaudet et al., 2017; Kubat, 2017; MacQuarrie, 2018; van Dijk-Wesselius et al., 2020). These assumptions limit the cultural perception of what constitutes educational learning spaces and who are identified as *educators*. In an evaluation of international studies on outdoor environmental education, Okur-Berberoglu et al. (2015) found that globally there is a substantial gap between the theoretical understanding and the practical application of outdoor learning. Stevenson (2007) suggests that there is a pedagogical and ideological conflict between the constructivist oriented

outdoor environmental education and the positivist, skills-based traditional classroom education that disrupts the integration of the two practices and supersedes the empirical evidence of the benefits (Glackin, 2016; Stevenson, 2007).

### **Disassociation of Learning and the Outdoors**

Theorists from multiple disciplines including relational discourse, critical ecological theory, eco-feminism, and embodied learning suggest a more fundamental inception of this dichotomy (Barrett, 2005; Beery, 2014; Rathunde, 2008). These theories attribute the disassociation between learning and the outdoors to the binary philosophy of Descartes (1596-1650), the French mathematician, scientist, and philosopher who is associated with the origin of rational, scientific thought. Descartes separated himself from the uncertainty of the natural world by reducing it to mathematical quantification and rejecting all knowledge that is based on the senses and resides the external world. This ideology is manifested in the culture/nature, mind/body hierarchal dualism that is pervasive throughout modern culture (Beery, 2014; Di Chiro, 2014; Gough & Whitehouse, 2018; Rathunde, 2008; St. Pierre, 2000; Whyte, 2013). Descartes claimed that the rational mind is superior to the senses and that man is detached from the natural world (Kuhn, 1996).

This dualistic, hierarchal thinking has relegated outdoor learning to the periphery of the educational ecosystem (Barrett, 2005; England, 2001; Gough & Whitehouse, 2018; Russel & Bell, 1996). In his discussion of embodied education, Rathunde (2008) refers to this conceptual barrier that has led to the disenfranchising of nature-based experiences as “Descartes error” (p.72). In their discussion on the future of environmental education, Barrett (2005) and Di Chiro (2014) suggest that for outdoor learning to be given legitimate educational value, we must recognize and address this dualistic thinking and *othering* of nature.

Rathunde (2008) argues that this disembodied philosophy is so deeply ingrained in the public consciousness that close to 90% of schools in the U.S. employ this Cartesian approach to education, privileging abstract thought over experiential and nature-based practices. As a result of these conceptual biases, research in outdoor education focuses almost exclusively on the experiences of classroom educators and the implications for supporting the curriculum with little attention to the informal and non-formal OEs' roles, identities, or recognition of their experiences and contributions (Glackin, 2016; Harris, 2018; Kubat, 2017; MacQuarrie, 2018).

### **Outdoor Educators' Identity in the Educational Ecosystem**

Outdoor educators inhabit an important role that connects abstract, conceptual classroom learning with natural, empirical learning environments; however, their voices are seldom heard. When they are acknowledged in discourse within the research community, the voices of OEs are reported as a unified monolithic identity, reducing them and their contributions to a singular undifferentiated object of the phenomenon rather than the subject. This backgrounding subverts the recognition and understanding of the breadth of pedagogical and content knowledge they bring to their programming.

Extant literature approaches the notion of identity construction among environmentally conscious adults in generalized and often theoretical terms. There is a body of research on human connectiveness with nature (Beery & Lekies, 2021; Capaldi et al., 2014; Kahn, 1997; Kellert & Wilson, 1993; Martin et al., 2020; Ulrich, 1993), the importance of childhood significant life experiences (SLE) in nature (Chawla, 1998; Palmer, 1993; Rosa et al., 2018; Tanner, 1980) and environmental identity (Clayton, 2003; Schulz & Tabanico, 2007). The implications of this affiliation with nature and how it is manifested in one's professional trajectory, influences career

choices, position with the environmental education community, and pedagogy are left unarticulated and undifferentiated.

Outdoor educators self-identify with a diversity of orientations including natural sciences, education, and social justice and have a range of depth, experiences, and qualifications (Leather, 2018; Payne, 2001). However, as Payne (2001) and Leather (2018) discuss, limited research has been conducted on OE identity. The few studies that have been conducted on OE identity are qualitative, focusing on the OEs' situationally specific professional experiences. The role of their social and developmental context and lived experiences are largely unexamined. Avraamidou's (2014) exploration of science teacher identity suggests that understanding educators' identity formation could be a valuable component of professional learning and development. The values and identities of educators play a central role in informing what they decide to teach and how they present the content (Carrier, 2009; Eick, 2012; Gatzke et al., 2015; Moore, 2008). The construct of identity addresses individual agency and sociocultural constraints that both shape and limit educators pedagogical orientations (Carlone & Johnson, 2007; Glackin, 2016; Moore, 2008). Investigating OE's positional identity and the phenomenon of what it means to be an OE within educational contexts would provide valuable insight to the role and contributions that OEs have in supporting the well documented benefits of outdoor learning in educational spaces. Lugg (1999) and Nazir (2016) suggest that the lack of rigorous, systematic research of outdoor education has resulted in lack of understanding of the achievements and contributions of OEs in educational systems.

The need to foreground the position of OEs within the broader educational ecosystem, address the Cartesian divide, and reconceptualize who we include in educational discourse is becoming more critical as global society becomes increasingly more complex, interconnected,

and demands socially and environmentally literate citizens. As research indicates that people learn most effectively when engaging in multimodal, authentic environments that are afforded in outdoor settings (Carrier, 2009; Eick, 2012; Rathunde, 2008) and as global communicable diseases are proliferating, outdoor learning is beginning to be discussed as a part of the future of education (Collins, 2020; Quay et al., 2020; Spiteri, 2020). In recent years, there have been a small number of international studies investigating the positional identity and the phenomenology of OEs in educational spaces (Field et al., 2016; Foran, 2015; Gunn, 2010; Hill, 2010; Nazir & Pedretti, 2016; Nicol, 2014), research is severely lacking in the U.S. context.

### **Significance**

The purpose of the present study is to uncover the unheard, authentic voices of OEs by investigating the fundamental question, “How do OEs construct their positional identities within the educational ecosystem?” Many studies have indicated that OEs play an important role in educational experiences, but limited research has been conducted on examining the factors, contexts, and experiences that impact OEs’ identity formation and professional trajectory. The contribution of this study is the challenging and re-imagining of the cultural discourse within the educational ecosystem that disassociates “legitimate” learning from the outdoors. The developing and validation of a survey instrument to generate generalizable, quantitative data accompanied by a qualitative phenomenological analysis can provide insight into the identity formation of this group of underrecognized educators and as Whyte (2013) suggests in his work on traditional ecological knowledge (TEK) systems, put OEs on the *conceptual radar* of educators and researchers. The present study aims to bridge the conceptual gap between the theoretical understanding and pedagogical application of outdoor learning to challenge assumptions about the definitions of *educator* within the current educational paradigm.

## Research Questions

To initiate this re-balancing and re-imagining of the identity and positionality of OEs within the educational ecosystem, both qualitatively and quantitatively, the present study employs a mixed methods approach guided by the following research questions:

**RQ1: How do outdoor educators' personal background influence their personal identities? (qual+QUAN)**

**RQ2: How do outdoor educators describe their pedagogical goals and positionality within their professional organization? (qual+QUAN)**

**RQ3: How are outdoor educators' professional identities recognized? (qual+QUAN)**

- How do outdoor educators perceive their professional position within the educational ecosystem?
- How do outdoor educators describe their positional identity in relation to formal educators?

## Limitations

The mixed methods design of this study was chosen to address the limitations inherent in single method qualitative and quantitative research studies. Quantitative survey studies are prone to selection and response bias as participants self-select and self-report. Myriad psychometric processes may influence participants' interpretation of the measures which can lead to skewed results and may not be a truly representative sample of the population under study.

Interpretations of the study may be influenced by the researcher's definition and choice of constructs being measured. Additionally, items that may be salient and provide rich information may not be represented due to limits set by the factor loading parameters and the correlation matrices of the statistical models used in survey validation. Similarly, qualitative results are also prone to biases due to limited sample pool, social desirability, and participants' cognitive distortions that can occur when recollecting past experiences. To address these limitations, the quantitative data were derived from a different sample population than the qualitative to offer

different perspectives, ensure that the constructs were representative of the broader OE population, results were consistent among different groups, and to reduce response biases, including my own. However, as van Manen (1997) acknowledges, one's biases can never truly be absent from the research process, only recognized and accommodated. Additionally, one cannot ever exhaust all the possible interpretations of lived experiences, only examine them until adequate evidence is gathered to capture the essential meaning of it. Every effort was made to represent OEs from different demographics and geographic regions to address sampling bias, however the Southeast region was heavily represented and non-White OEs were difficult to recruit.

### **Definition of Terms**

For clarity, the following definitions of the key terms employed within in the present study are provided below.

***Affection connection***- socio-emotional attachment to a place or community that creates a positive and lasting bond

***Advocacy***- actively supporting and influencing others to affect a cause or policy

***Core identity***- one's beliefs of what is right or wrong that is learned and adopted from childhood and influences who they are and how they interact in the world

***Educational ecosystem***- formal indoor and non/informal\* outdoor learning spaces that together form an interactive learning and teaching environment

\*According to OECD (n.d.), *informal learning* is not organized, has no set objective and is often referred to as learning by experience. *Non-formal learning* takes place outside formal learning environments but has an organizational framework and is a result of intentional effort.

***Organizational position***- level of respect, autonomy, and power to make decision within the social-power structure of one's professional institution

***Outdoor educator***- a professional who shares their knowledge, skills, and experiences with learners in outdoor, natural spaces outside of formal classrooms

***Personal identity***- values, beliefs, and worldview developed about oneself that evolves over the course of one's life

***Positional identity***- how one is defined and recognized within society in relation to social structures, power, and institutional affiliation

***Professional legitimacy***- being valued, respected, and recognized by others in their field of work for one's knowledge, experience, and contributions

***Science identity***- the extent to which a person affiliates with the discipline of science as a profession and/or recognizes oneself as being part of a scientific community (either formal or nonformal)

## **CHAPTER 2**

### **LITERATURE REVIEW**

Educating about the environment and providing access to the outdoors as a living and learning space is vital to ensure the well-being and healthy development of both humans and the natural world (Mitten et al., 2018). Yet, little is known or acknowledged of the voices and positionality of the OEs who contribute to the extensive benefits of outdoor experiences (Barrett, 2005; Mitten et al., 2018; Piersol & Timmerman, 2017). The vast majority of studies that have been published on outdoor and environmental education (EE) quantitatively evaluate pre- and post-test student outcome data (Berman et al., 2008; Cho & Lee, 2018; Engemann et al., 2019; Moseley et al., 2002; Sivarajah et al., 2018), explore educators' self-efficacy (Carrier, 2009; Glackin, 2016; Sia, 1992), or measure classroom teachers' values and beliefs regarding outdoor learning (Boileau & Dabaja, 2020; Smith-Sebasto, 1998). There have been qualitative investigations of the beliefs and practices of OE and EE certified classroom teachers (Eick, 2012; Gatzke et al., 2015; Glackin, 2016; Hill, 2010; Piersol & Timmerman, 2017), and studies describing OEs' orientations to their constituents within their current professional role (Foran, 2005; Fuentes Amaya, 2004; Leather, 2018; Nazir & Pedretti, 2016). Research on OE and EE has rarely investigated the motivations and goals that led to OEs' identity formation and positionality within educational ecosystems.

There is a substantial body of work within the EE literature describing the influence of significant life experiences (SLE) on adults' care for the natural world and their environmental identity, however, not their positional identities as educators (Carson, 1965; Chawla, 2007; Palmer, 1993; Tanner, 1980; Wells & Lekies, 2006). Tanner (1980) initiated this line of inquiry through his analysis of environmental conservationists' autobiographical accounts of their

childhood experiences in nature with trusted adults as an antecedent to their environmental ideology, behavior, and advocacy. Similarly, work by Kahn (1997) and Kellert and Wilson (1993) investigate human's relationship with nature being fundamental to personal development through the socioecological concept of biophilia. Schultz and Tabanico (2007) discuss experiences in the outdoors in the context of one's environmental identity development. More recently, Capaldi et al. (2014) and Beery and Lekies (2021) have investigated the connection between nature experiences and human well-being and psychological development. These studies approach the construct of identity but do not differentiate among the numerous manifestations of environmentalists, conflating them as a monolithic entity and use the terms “environmentalist”, “environmental educator”, “outdoor educator” and “environmental advocates” interchangeably. The present study investigates the identity development of environmentalists who solely identify as OEs, defined in this study as *a professional who shares their knowledge, skills, and experiences with learners in outdoor, natural spaces outside of formal classrooms.*

Understanding an educators' personal motivation and intentionality is essential to understanding their positional identity and pedagogy (Avraamidou, 2014; Moore, 2008). As one's positional identity is a product of the context in which it is situated (Avraamidou, 2014; Gee, 2000; Hogg et al., 1995), one must first understand the context of the outdoors as a learning environment and the associated physiological, educational, and societal implications of such environments on learners before the OEs' positional identity within it can be understood.

### **Outdoors as a Learning Space**

Researchers (Collins, et al., 2020; Ferrini, 2003; Kaplan, 1995; Kuo, 2015; Murakami et al., 2018; Sobko et al., 2020) have identified the important role that time spent in the outdoors

can have for both individuals and the broader culture. Research in education and in public health provide evidence that healthy human development is intricately connected to affiliation with natural environments. The benefits of learning in outdoor spaces span from the physiological and academic to socio-economic.

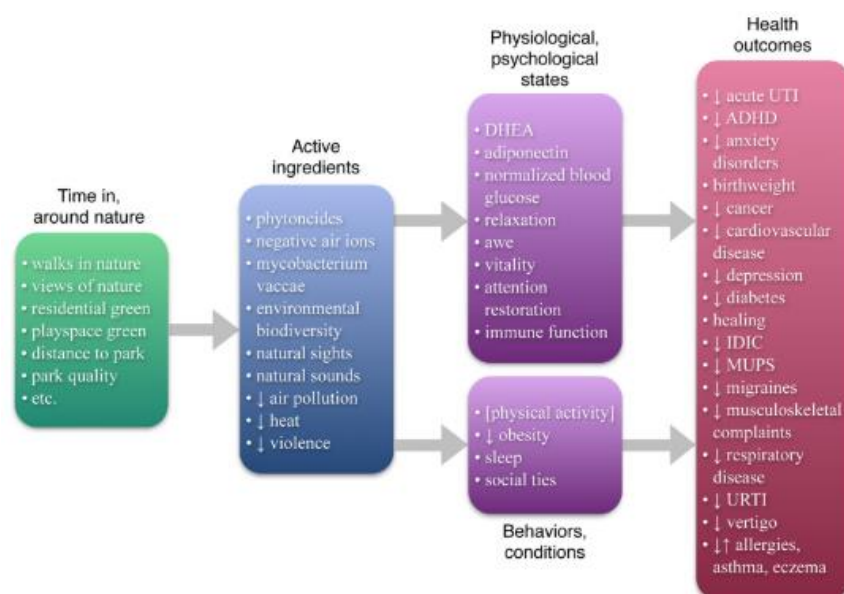
### ***Physiological Benefits***

Research on the implications of spending time in the outdoors suggests significant physiological benefits through multiple biochemical and neurological pathways. One such pathway includes a class of volatile organic compounds (VOCs) called phytoncides. Plants produce these VOCs as a defense mechanism. In humans, breathing in these chemicals increases the production of a class of white blood cell called natural killer (NK) cells that target tumor and virus-infected cells. Controlled studies have shown a significant increase in immune functioning and a positive effect on physical health when participants were exposed to these VOCs (Kuo, 2015; Li et al., 2009). Roslund (2020) conducted a 28-day controlled study with pre-school children participating in nature-based programs compared with those in urban programs. The authors found an increase in skin and gut microbotia and blood immune markers such as TGF- $\beta$ 1 levels and regulatory T cells in students who were exposed to natural spaces. The findings suggest that exposure to environmental microbial diversity can lead to increased immune function and reduced risk of immune-mediated diseases. A study by Sobko et al. (2020) found a strong correlation between children's increased exposure to natural environments, particularly when getting their hands dirty in soil, and a significant increase in the richness of their gut microbiota. In this quasi-experimental study, students who were exposed to the outdoors had increased microbial diversity associated with increased serotonin levels and a subsequent decrease in stress responses and displays of anger in the classroom. Kaplan's (1995) work on attention restoration

theory (ART) suggests that mental fatigue and concentration can improve by spending time in and observing nature. Berman et al. (2008), drawing on Kaplan's (1995) work, conducted a series of memory and retrieval tasks with university students before and after exposure to natural environments and found that time in nature significantly improved the students' directed attention and cognitive function. Similarly, comparison studies of adults living near urban and natural areas found that living near forested areas has a positive effect on the amygdala, stress regulation, and brain plasticity (Kühn et al., 2017). Exposure to natural environments has been identified as an effective therapeutic medium for learners with cognitive and behavioral challenges (Berger, 2006; Kaplan & Berman, 2010). Recognizing the multitude of health benefits of human contact with nature, Kuo (2015) conducted a study to identify the mechanisms contributing to the positive outcomes from nature exposure. She identified 21 possible pathways leading to mental and physical health outcomes. Figure 2.1 illustrates the physiological effects and observed outcomes of nature exposure.

### Figure 2.1

*Effects and Outcomes of Nature Exposure (Kuo, 2015)*



### ***Benefits of Learning and Development***

Studies in educational neuroscience recognize that mental and physical health are intrinsically connected to learning (Hinton et al., 2008; Tyng et al., 2017; Wilson & Golonka, 2013). Cognition is a product of dynamic social, physiological, and sensorial processes and each of the associated affective, motor, and cognitive neural networks are fundamental in academic and social development (Darling-Hammond & Cook-Harvey, 2018; Hinton et al., 2008; Lewallen et al., 2015; Noddings, 2005; St. Pierre, 2000). Decades ago, Bloom and colleagues (1956-1972), devised separate taxonomies of learning in each of these domains, encompassing cognitive, affective, and psychomotor processes (Hoque, 2017). As the field of the learning sciences has advanced, researchers are recommending that education policy and design should include integrative curricula that unites these domains into a whole-child, whole-brain paradigm (Darling-Hammond & Cook-Harvey, 2018; Hinton et al., 2008). Noddings' (2005b) work on educating the whole child suggests that learning and development cannot be compartmentalized. Fragmented curricula that disembodify students from their learning and lack emotional, social, and physical connection undermines authentic learning and healthy development. Outdoor education research has demonstrated that outdoor learning satisfies this call for holistic learning and provides benefits in each domain of Bloom's taxonomy (Beery & Lekies, 2021; Bento & Dias, 2017; Spiteri, 2020). Outdoor experiences have positive effects on physical development (Murakami et al., 2018), social emotional development (Berger, 2006; Sobko et al., 2020; Engemann et al., 2019; Ferrini, 2003), and cognitive development (Harris, 2018; Kubat, 2017; MacQuarrie, 2018; van Dijk-Wesselius et al., 2020). Outdoor learning affects development in all domains in tandem; however, most often cited in education literature is the effect of outdoor

education on the cognitive domain (Berman et al., 2008; Harris, 2018; Kubat, 2017; Murakami et al., 2018).

**Cognitive Domain.** The cognitive domain encompasses learning skills related to mental, or thinking processes related to constructing understanding and making sense of information. Research often describes that the basic aim of outdoor learning is to strengthen and apply academic content learned in the classroom (Kubat, 2017; van Dijk-Wesselius et al., 2020). Learning in natural spaces elicits the problem solving, critical thinking, and intellectual creativity that have been deemed necessary for the 21<sup>st</sup> century learning paradigm (Egger et al., 2017; Kubat, 2017; Poland et al., 2017; Rinke et al., 2016). The outdoors can provide a context for connecting abstract concepts presented in the classroom to relevant real-world phenomena and opportunities for active participation (Ernst, 2014; Harris, 2018; MacQuarrie, 2018; Rios & Brewer, 2014). Research has shown that learning in authentic contexts with real-life activities leads to student inquiry and motivation by making academic content accessible and relevant (Bransford et al., 2005, Hinton, et al, 2017; NRC, 2012). The range of experiences possible in the outdoors offers opportunities for students to engage in multiple learning modalities, or sensory pathways, including visual, auditory, tactile, and kinesthetic to make learning accessible. Accessing these multiple pathways develops cognitive connections that have shown to have a measurable impact on students' conceptual understanding (Eick, 2012; Harris, 2018; Rios & Brewer, 2014). Moore & Marcus (2008) and Carrier (2009) found significant positive effects on students' knowledge and attitudes when learning took place in the schoolyard compared with indoor classrooms.

**Affective Domain.** The affective domain is concerned with feelings, attitudes, and socio-emotional skills that establish a system of values and beliefs and promote motivation to learn.

Affective processes are fundamental to students' cognition (Hinton et al., 2008; Noddings, 2005a; Pierre & Oughton, 2007). In studying the physiological mechanisms of learning, neuroscience has demonstrated that feelings of emotional safety and connection initiate access to neurological pathways within an affective-cognitive network. The amygdala in the limbic system, the region of brain known as the emotional gate keeper, regulates the functioning of cortical areas that are fundamental to cognitive processing and learning (Hinton et al., 2008; Tyng et al., 2017).

Theorists in both neuropsychology and sociobiology discuss that this affective network can be accessed through spending time in natural, green spaces (Engemann et al., 2019; Kahn, 1997; Mygind et al., 2018). Kellert and Wilson (1993) describe the sociobiological concept of biophilia, suggesting that due to human's innate connection with the natural environment, interacting with natural communities and interacting with plants and nonhuman animals in the outdoors can promote agency and relatedness that are central to self-determination (Ryan & Deci, 2000) leading to motivation, attitude of worth, and emotional engagement in learning (Heerwagen & Hase, 2001; Skinner & Chi, 2012; Waliczek et al., 2001). Becker et al. (2017) conducted a systematic review of outdoor education programs (OEPs) and found that globally, participating in OEPs had positive effects on students' mental health, social competence, and academic achievement. Van der Hoen Kraft, et al. (2011) integrated natural environments into a geological science course and found that students' emotional connection to the environment and their intrinsic academic motivation were positively correlated. The integration of natural learning environments within the curricula resulted in their students becoming more engaged in the content and willing to participate in inquiry, argumentation, and critical thinking. Students developing socioecological connections with nature can lead to integrating values, beliefs, and

pro-social behavior that becomes integrated into their worldview and promotes healthy socio-emotional development.

**Psychomotor Domain.** Studies have shown that the kinesthetic experiences in which learners engage while physically participating in outdoor activities employ sensory-motor neural pathways that can strengthen synaptic connections and deepen classroom learning (Anderson, 2005; Glenberg et al., 2013; Hinton et al., 2008; Ionescu & Vasc, 2014). According to embodied learning theories, human cognition is grounded in perceptual and physical interactions of the body with the environment. Exposure to full-bodied experiences is an essential pre-cognitive process that allows for future meaning making and abstract thought (Rathunde, 2008).

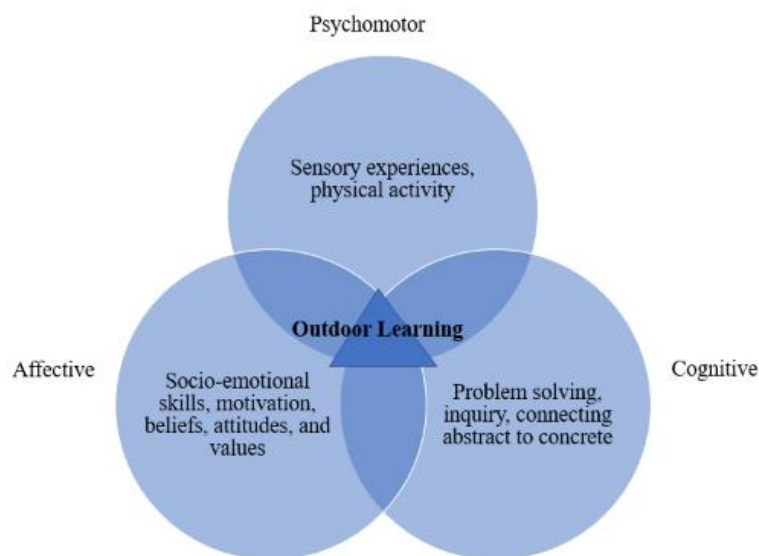
Participating in hands-on activities that engage learners in discovery, observation, and movement during investigations in the outdoors leads to both cognitive and physical development (Becker et al., 2017; Kubat, 2017; van Dijk-Wesselius et al., 2020). As learners touch and feel objects and manipulate tools, they gain cognitive awareness while refining their motor skills and enhancing their proprioception, the body's ability to sense movement and location (Hoque, 2017; Murakami et al., 2018).

**Integration of Domains.** Both sociocultural learning theories and neuroscientific studies suggest that learning is an integrated, socioecological process. Cognitive development occurs as we physically and emotionally interact with each other and our environment (John-Steiner & Mahn, 1996; Rathunde, 2008). Conceptual knowledge begins with the gestalt of external sensory experiences. This sensory-motor neural pathway is then mediated through emotional responses evaluating the sense of social belonging and emotional safety before cognitive pathways can be accessed (Hinton et al., 2008; Rathunde, 2008; Tyng et al., 2017). Outdoor learning is uniquely situated to support and integrate each of these neural processes among all the learning domains

and enhance authentic learning and concept integration (Figure 2.2). Education research suggests that students must be exposed to multi-modal learning to engage multiple sensory pathways and learning should extend beyond the walls of the school building (Avraamidou, 2015; Carrier, 2009; NRC, 2012; Smetana, et al., 2017).

### **Figure 2.2**

*Integration of Learning Domains (Adapted from Spiteri, 2020)*



### ***Benefits of Societal and Mental Health***

The increasing frequency of global epidemics has led to renewed interest in the development of open-air methods for institutional spaces (Kahn & McIntosh, 2005; Korr, 2016). Studies of historical records describing the tuberculosis outbreak in the 1700's and the 1918 Spanish flu pandemic found that open-air facilities mitigate disease transmission due to ventilation and exposure to the sun's UV rays that make conditions inhospitable for viral proliferation (Hobday & Cason, 2009).

The recent SARS-CoV-2 (COVID-19) pandemic has re-ignited discussions regarding the incorporation of outdoor learning into traditional classroom spaces in anticipation of the need to provide a safe and stimulating learning environment for students in the event of future pandemics (Quay et al., 2020; Spiteri, 2020). The COVID-19 lockdowns have demonstrated that pandemics lead to the disruption of educational and social structures, negatively impact mental health (Serafini et al., 2020). Lack of access to social institutions such as schools disproportionately affect already marginalized communities by exacerbating social and educational inequity by deepening the digital-divide and barring access to vital social support. Additionally, it highlights the importance of students' interacting in authentic learning environments (Collins et al., 2000). UNESCO estimates that due to the COVID-19 pandemic close to 90% of the global student population have experienced disruptions in their learning (Spiteri, 2020).

The recommended physical distancing to mitigate disease transmission suggests that teaching outdoors can be a practical solution to provide safe learning spaces. An increasing number of teachers world-wide are beginning to embrace outdoor learning and express an openness to new practices and re-thinking of traditional teaching and learning systems. Blended learning approaches are becoming more prevalent post-COVID and there is growing recognition by policy makers of the potential benefits of incorporating outdoor learning into the traditional school day (Collins et al., 2020; Quay et al., 2020). COVID-19 has highlighted the value of outdoor education in our society and demonstrated that it is able to meet students' academic and socioemotional needs in a safe and effective way (Collins et al., 2020; Spiteri, 2020). The expertise of OEs to support teachers in integrating outdoor learning to their curricula is available, but not commonly recognized in traditional education systems.

It is important to disrupt the notion that outdoor learning is peripheral to pedagogical practice. Spiteri (2020) suggests that the challenges of integrating outdoor learning into school curricula can be addressed by encouraging interactions between educators inside and outside of the classroom. According to a policy brief from The Lawrence Hall of Science, environmental and outdoor educators must both have a seat at the table and become part of the conversation regarding policies and practices to meet the evolving needs of a post pandemic educational ecosystem (Collins et al., 2020).

### **Outdoor Educators in the Educational Ecosystem**

Despite the abundant evidence of the benefits of situating learning in the outdoors, outdoor education as a profession is still not well recognized. Multiple disciplines discuss the marginalization of outdoor learning as stemming from the philosophical ideas of Descartes (1596-1650) who with the phrase, “Cogito, ergo sum” (“I think, therefore I am”) created the deeply held hierarchal divide between nature and culture, mind and body (Beery, 2014; Rathunde, 2008; St. Pierre, 2000; Stevenson, 2007; Whyte, 2013). This binary thinking assumes that the mind is superior to the senses and humans are detached from the material (natural) world (Kuhn, 1996). Rathunde (2008), in his discussion of embodied learning, Stevenson (2007) in his analysis of outdoor environmental education in schools and Whyte's (2013) discussion on traditional ecological knowledge (TEK) collectively suggest that reuniting this duality and the integration of nature-based and traditional knowledge systems with classroom learning is necessary for the future of education.

Gough and Whitehouse (2018) argue that the future of environmental education relies on confronting this duality of knowledge systems. Barret (2005) suggests that examining discursive barriers that get in the way of addressing hegemonic educational practices may open the

possibility of changing our perception of legitimate learning. Emblematic of this hegemonic divide, current research focuses almost exclusively on reports and outcomes of outdoor learning experiences from the classroom teachers' and students' perspective, the voices and experiences of the OEs are seldom heard. Krumer-Nevo (2009) discusses "voice" as a metaphor for recognizing legitimate knowledge and relevance. Wertsch's (1991) discussion in *Voices of the Mind* suggests that the voice is a device that manifests one's consciousness through communicative processes. In his work, Wertsch (1991) emphasizes the socially mediated function of the mind; when one speaks it is the product of the internalization of a dialectic social process which privileged some voices over others.

Due to this privileging of the formal educators' voices in educational discourse, few investigations have been conducted on the OEs' positional identity, defined in this study as *how one is defined and recognized within society*. In the present study, *society* indicates not only the general public but within the educational ecosystem (the social, community, and academic learning institutions that form a learning and teaching environment) of which they are a part. Revealing the unheard voices of OEs can address the discursive barriers underlying the conceptual divide between indoor and outdoor education, create new opportunities for growth, and provide a space at the table for their perspectives to be recognized. As Spiteri (2020) and Collins et al. (2020) suggest, recognition of both sets of voices from indoor and outdoor educators must be equally represented to ensure a learning environment in which students can engage in holistic, integrative learning in a safe and authentic environment.

### **Current Research on Outdoor Educators**

The representational equity of indoor and outdoor educators is seldom achieved in educational research. Globally, studies of outdoor and environmental education represent OEs as

an auxiliary rather than intentional subjects of investigations. Much of the current research is orientated towards the outcomes, processes, and perspectives of formal educators with recognition of OE identity being peripheral. This approach is evidenced in van Dijk-Wesselius et al.'s (2020) collaborative action research project in the Netherlands in which teachers formed a Community of Practice (CoP) with researchers and outdoor professionals to support the teachers' development of outdoor pedagogy. The study featured teachers' reports of being inspired by working with outdoor professionals, yet the OE voice was not elicited nor was it represented.

In the United Kingdom and Scotland, MacQuarrie (2018) implemented a long-term teacher training project (3-9 months in duration) in which a training guide for outdoor teaching was designed as an intervention. The guide was reviewed by teachers who possessed outdoor learning qualifications but identified as classroom teachers. The procedure and results of the intervention were reported through the lens of the classroom teachers, excluding the OE perspective. In an investigation of a forest school CoP with teachers and OEs, Harris (2018) conducted interviews including topics such as, "What aspects of the forest school learning space support pupils' experience of learning?", "How does the learning space differ from that in the classroom?", "How does the learning space affect teaching and the dynamics of leaning?" This study reported the OEs' observations of the student outcomes as a result of their collaborations with the classroom teachers, however, their personal identities as OEs and pedagogical perspectives were not discussed. Similarly, in England, Waite (2011) and Glackin (2016) discuss the aims and pedagogy of outdoor education with respect to classroom teacher implementation of and orientation to outdoor learning; professional OEs outside of the formal education system were not included in the discussion.

In Australia, Gunn (2006) conducted a phenomenological study to investigate the lived experiences of professional OEs within the Victorian secondary school system. The author conducted interviews with 18 OEs to learn about their perspectives and gain an understanding of their objectives and the barriers they encounter in their work. He found that even in the state of Victoria, often regarded as having the most highly developed outdoor education system in Australia, little was known about the OEs' personal and positional identities. Gunn (2006) suggests a need for communication between schools and OEs so formal educators can become more aware of the OEs' motivations and pedagogy within the educational community. In Canada, Foran (2015) conducted a phenomenological study with OEs working in public schools to investigate their experiences and pedagogical relationships with students in outdoor experiences. In this study the OE was backgrounded with the student experience being the subject, revealing very little about OE professional identity within the phenomenon.

Another qualitative study conducted by James and Williams (2017) in the U.S. explored the effects of outdoor educational experiences on middle school students from teachers' and students' perspectives. Nicol (2014) also used a phenomenological approach to discuss the value and significance of outdoor, natural experiences within educational contexts, however, it was a theoretical discussion and did not include mention of OEs' positional identity within the phenomenon. The OEs in Nicol's (2014) study were backgrounded as objects to support the supposition that phenomenology could be a useful research methodology to investigate nature-based experiences, the OEs' experiences were not discussed. Each of these studies address outdoor education but not the outdoor educator.

There have been some studies that foreground OEs and elicit their voices; Nazir and Pedretti (2016) conducted a phenomenological case study at a Canadian outdoor education center

in which they reported the experiences of OEs within their professional positions and how their belief systems of environmental consciousness is manifested in their pedagogical practices. Research questions were limited to current beliefs, with minimal emphasis on the OEs formative personal experiences and influences. In a study of U.S. and Canadian OEs, Field et al. (2016) also conducted a phenomenological study in which they investigated the challenges and benefits the OEs described regarding their lived experiences as outdoor wilderness field instructors. The findings were limited to OEs' discussion of their job-related experiences, not their personal or professional identity development. Similarly, in New Zealand, Hill (2010) conducted interviews with four OEs in the school system to understand their perspectives on their programming to provide insights into the views, learning outcomes, and beliefs and values that motivated their practice and pedagogy. This study provided insights into OEs' personal identities and beliefs related to their goals for their programming. The author acknowledged that the study was not generalizable but provided a model for future education researchers to examine how OEs' beliefs and identities influence their programmatic practices within educational ecosystems.

There have been several studies in which the OEs' personal identity development is the intentional subject, although not within an educational context. Chawla's, (1998, 2007) work on the influence of SLEs on environmental educators' identity formation focuses on their personal identity in terms of behaviors and environmental sensitivity but does not address their positional identity within the educational ecosystem. One of the implications Chawla (2007) discusses in her work is the need for research to focus on how the social construction of OEs' positional identity influences their motivation and identity as members of the environmental education community. Corcoran (1999) employs a narrative approach following Tanner (1980) and Chawla's (1998) work on SLE to elicit the voices of environmental educators regarding their

pro-environmental activities but did not attempt to connect the voices to their outdoor teaching pedagogy or identity as *educators*.

Through a discursive analytic approach, Fuentes Amaya (2004) investigated outdoor environmental educators' identity construction in Mexico. The aim of this study was to define a professional identity construct, not specific to personal identity development. This study sought to challenge the notion that OEs possess a singularly unified identity and describes that the phenomenon is multi-faceted and a product of complex social processes formed in response to shifting political and cultural ideologies. She found that one cannot distill OEs' identity to one construct, and that there is not a fixed "Mexican environmental educator" identity but a multitude of historical processes in which this identity is manifested.

In Australia, Payne (2001) approached the investigation of OEs' identity in relation to their personal and political views of teaching but not in their pedagogy or personal identity development. Within his discussion Payne (2001) acknowledged that there is a considerable lack of discourse in environmental education research associated with educators' identity. Even fewer studies include intentional analyses of personal identity development processes of OEs and their connection to their professional pursuits. Payne (2001) asserted this of lack research decades ago, yet the paucity persists today. Gatzke et al. (2015) in her reflective analysis examining outdoor educators' professional identity and pedagogical practices and Avraamidou's (2014) work on educator identity both emphasize the need to employ identity frameworks to explore educators' positional orientations and social recognition.

### **Outdoor Educators Identity Through Recognition and Discourse**

According to Gee's (2000) theory of identity, the power of identity comes from the social recognition of it. One must be seen in a certain way in society for an identity to be recognized.

Recognition is achieved most directly through discourse which is developed through engaging in dialogue with others. Gee (2000) interprets what he terms *socially situated identity* as “the kind of person” one is within a given social context. Gee (2000) posits that identity is not fixed but is negotiated through dialogical relations and one’s position within a social system. Similarly, Myin and Zahnoun (2018) support the notion of a socially situated perception of identity development in their discussion of identity as *embodied* and a product of individual-environment interactions. Beijaard et al. (2004) describe that one’s identity is not a fixed attribute, but a relational phenomenon influenced by one’s experiences and personal background.

### ***Educator Professional Identity***

Positional identity refers to how one is defined and recognized within society including institutional affiliations. A subset of positional identity is the notion of professional identity in which the definition of oneself and how one is recognized by others is influenced by membership within a professional community (Gecas & Burke, 1995; Wenger, 2000). Beijaard et al. (2004) building off Gee’s (2000) notion of socially situated identity discusses identity in the context of *teacher* professional identity which is defined as the blending of social expectations of the kind of person one is with one’s classroom experiences and their personal backgrounds. A teacher’s professional identity strongly influences how they approach their practice (Beijaard et al. 2004; Moore, 2008). Therefore, it is an important analytical lens for understanding one’s professional trajectory (Akerson et al., 2014; Avraamidou, 2014; Gee, 2000).

Eick (2012) and Payne (2001) discuss that teachers’ personal beliefs and formative experiences are strong determinants of their professional actions and can be reinforced or undermined by how external audiences respond to and recognize them in professional situations. Professional identity frameworks have been applied to the investigation of teachers’ professional

identity formation (Beijaard et al. 2004; Berger et al., 2019; Sardabi et al., 2018), and both formal (Akerson et al., 2014; Andreassen et al., 2019; Avraamidou, 2014a, 2014b; Carrier et al., 2017) and informal science teacher identity development (Adams & Gupta, 2017; Wallace & Brooks, 2015). Less investigated within this body of research on educator professional identity is the study of outdoor and environmental educator professional identity. This research critically analyzes the relational discourse and lack of recognition of OEs and EEs that position them on the periphery of educational ecosystems (Barrett 2005; Hill, 2010; Gough, & Whitehouse, 2018 Pierson & Timmerman, 2017).

### ***Outdoor Educators as Peripheral Identities***

The education profession in the United States has historically been marginalized. In his work on the history of teacher education in the U.S., Labaree (2008) discusses education professionals being relegated to low status on the social spectrum and the perception of teaching as being vocational and consigned to “woman’s work” (p. 298). Horn and Campbell (2015) suggest that the widespread undervaluing of the education profession reduces teaching to a technical activity with little need for professional development. OEs confront the dual challenges of the under recognition of the education professional and the perception of the illegitimacy of outdoor learning (Barrett, 2005).

Piersol and Timmerman (2017) suggest that the illegitimacy of outdoor learning is rooted in the binary Cartesian logic fragmenting indoor and outdoor learning, subordinating the outdoors and silencing this different way of knowing. Gough (1999) further presents the concern that due to this subordination, EE and OE are generalized and appended as a peripheral component of other disciplines such as science, recreational, and adventure education, masking their unique and individual contributions. Lugg (1999) identified the lack of understanding of the

structure of outdoor education in the Australian education system as a barrier to policy makers valuing its contribution as a legitimate component to the national curriculum. Similarly, Hill (2010) refers to “semantic confusion” (p.30) being at the core of the under recognition of outdoor learning as a viable niche in educational ecosystems.

As in any relational ecological system, for an educational ecosystem to be healthy and functional, the recognition and interdependence of both indoor and outdoor voices are necessary. All interacting niches and contributions, no matter the magnitude, are necessary for a system to thrive (Mitten et al., 2018; Piersol and Timmerman, 2017). Mitten et al.’s (2018) work on subordinated identities in outdoor environmental education (OEE) suggest the redistribution of unnoticed voices to actively challenge the perception of who are recognized as educators in the current sociocultural consciousness. Embracing the voices of others beyond those of traditional educators would ensure the representation of all who contribute to OEE.

Dialogue could be an important tool to disrupt the hierarchical discourse that backgrounds the voices of OEs, reorient them, and challenge current structural and paradigmatic assumptions of what and who is recognized and identified as contributors within educational ecosystems. As language and discourse are the vehicles with which one interacts with and approaches the world, through altering the relational discourse OEs can reposition themselves and redefine and reframe their positional identity within the educational ecosystem (Barrett, 2005). Piersol and Timmerman (2017) suggest using language and discourse to build relationships to encourage identity recognition between indoor and outdoor educators. To connect each’s unique contributions while honoring their inherent differences, it is necessary to acknowledge the diversity of voices. Di Chiro’s (2014) critique of OEE suggests that if social relations created the conceptual divide, it could also change and improve them.

Gough and Whitehouse (2018) argue that if we are to benefit from outdoor learning, future discourse must support the dialogic relationship and social-interactive representations of both teachers and OEs within the educational ecosystem. Providing a space to reveal the contributions of OEs can refigure their positional identity as professionals in educational contexts, reunite the Cartesian duality, provide a new direction to reconceptualize their previously under recognized voices, and benefit from the array of experiences and knowledge they contribute.

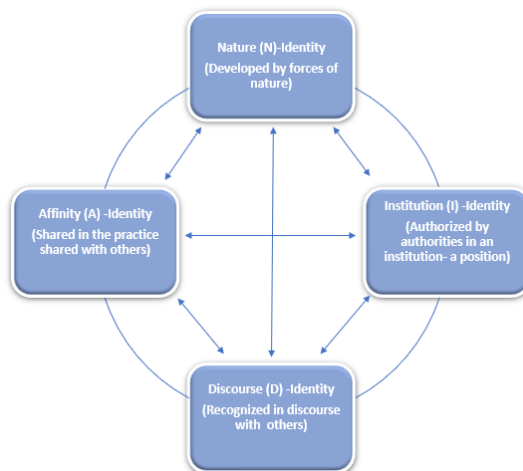
### **Theoretical Framework**

The theoretical underpinnings of the present study draw from the methodological approach of the social psychological theories of identity construction. Identity theories are a complex combination of ideologies derived from multiple areas of study that are grounded in sociocultural perspectives and serve as a useful lens for which to investigate an individual's position and recognition within social groups. Studies of identity can be traced back to Tajfel (1959, 1974) and his psychological theory of *social identity* in which he suggests that one's identity is defined by the group to which one belongs and is grounded in membership to that group. Relatedly, the sociological theory of *identity theory* discusses identity formation with respect to one's role within a group and its social construction through interpersonal interactions within the group (Hogg et al., 1995; Sets & Burke, 2000). While each theory presents a different perspective of identity formation, both recognize that identity is a socially constructed process. Sets and Burke (2000) suggest that while social identity theory is based on a sense of *who* one is within a group and identity theory is concerned with *what* one does in their role within the group, both are essential components of one's identity.

The present study draws on Gee's (2000) syntheses of both identity and social identity constructs which discusses the concept of identity as a socially situated construction encompassing both the *who* and the *what* of identity development as people interact in social communities and create and recreate themselves through their socially recognized positions. Gee (2000) describes identity as a multi-faceted, dynamic process influenced by four interacting perspectives consisting of (a) one's nature-identity (N-identity), which he discusses as traits, attributes, or states with which one is born, such as being a twin or an introvert, (b) institution-identity (I- identity) which is derived from the position given to one by a set of authority figures, (c) discourse-identity (D -identity) which is developed by how one interacts with and is treated or talked about by others, and (d) and affinity-identity (A- identity) which is developed by being affiliated with a group of people who engage in a common set of practices and activities and have shared experiences. Identity is fluid in that the type of identity that may dominate depends on the social context and one's position within that context, with each influencing the formation of the others, as seen in Figure 2.3. Central to Gee's (2000) argument is that for one's identity to be salient it must be recognized by others. One must be recognized as being a certain "kind of person."

**Figure 2.3**

*Model of Four Dimensions of Identity Construction (Adapted from Gee, 2000)*

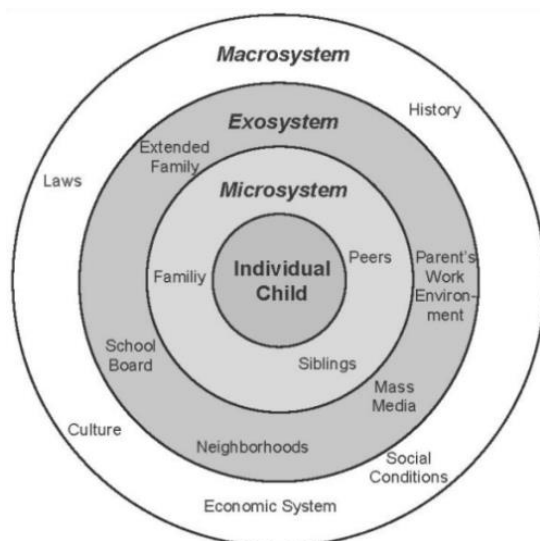


Identity theories are useful frameworks to discuss social factors of recognition and how identities are interpreted, however, they do not consider the initial formation. Bronfenbrenner's (1977) theory of development takes an ecological systems approach to describe one's core identity formation as a multi-level social system in which social and environmental components influence one's psychological development. His approach to core identity development is through analyzing human interaction with their environment. He believed that development occurs through dynamic interactions between an individual's social, cultural, and physical settings. Bronfenbrenner (1977) posits that one's core identity development is a product of socioecological influences within a nested social structure, consisting of an initial microsystem which is comprised of one's relations within their immediate social and the physical environment (parents, siblings, home). This microsystem is the most influential system of development. Next is the mesosystem which is comprised of a system of microsystems (e.g., peer groups, family, school). The mesosystem extends to an exosystem which is a system consisting of social institutions, the workplace, one's neighborhood, and media to which an individual is exposed.

Finally, the macrosystem is more abstract and encompasses the values, cultures, and subcultures that create social expectations and the worldview of members of a given society. Figure 2.4 illustrates Bronfenbrenner's multi-level model of development. The mesosystem is not visualized as it is simply a composite of microsystems.

### Figure 2.4

*Bronfenbrenner's (1977) Social Ecological Model of Human Development (Kristianstad University Sweden, n.d)*

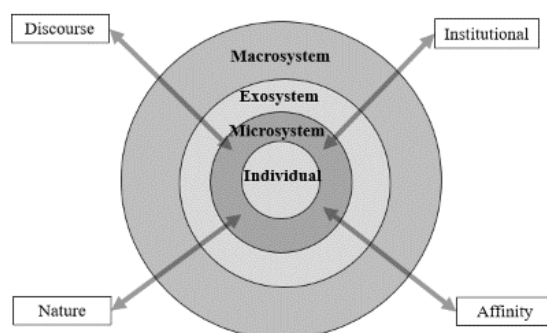


The present study synthesizes Bronfenbrenner's ecological systems theory of psychological development and Gee's theoretical perspective of how one's core identity, once developed, is socially situated and recognized as "the kind of person" one is. The integrated model illustrates that one's early life experiences within their mesosystems shape their beliefs and values and influence their personal identities which later manifest into their professional and institutional identities (Carlone & Johnson, 2007; Chawla, 2007; Gee, 2000; Leather, 2018; Payne, 2001). The professional position within ones' organization in the exosystem establishes

how one's institutional identity is recognized and subsequently how one's professional identity is established within the broader cultural macrosystem (Figure 2.5).

### Figure 2.5

*Synthesized Model of Gee's (2000) Identity Constructs and Bronfenbrenner's (1977) Ecological Systems Theory*



### Summary of Chapter

The existing research base investigating outdoor education and outdoor educators primarily focuses on its beneficial outcomes and challenges. Decades of research has revealed the physiological, cognitive, and psycho-social benefits of the outdoors. The identities of the educators who deliver these benefits is less investigated. Studies that have explored the identity of educators in outdoor environments often conflate the experiences of classroom educators, environmentalists, and OEs as one indistinct orientation (Eick, 2012; Gatzke et al., 2015, Glackin, 2016; Murakami, 2018). There have been phenomenological studies that exclusively investigated OEs' lived experiences teaching in the outdoors in relation to their professional experiences, however, few have approach the phenomenon of OE identity development and

recognition in the public sphere or among other educators (Field et al., 2016; Foran, 2005; Nicol, 2014).

Similarly, there is a dearth of existing instruments to investigate and measure OEs' identity development, values, and self-concept. Some existing research measures efficacy and outcomes the outdoor learning experience itself, but not OEs' positional identity and personal or professional contributions to the learning (Boileau & Dabaja, 2020; Smith-Sebasto, 1998). The present study was designed address the dearth of instruments and rigorous research. Through the framework of identity development and recognition, this study aims to reveal the voices of these OEs and create a discursive bridge among indoor and outdoor educators to honor the diversity of voices and broaden the perception of OEs contribution to educational spaces. A mixed methods approach applying identity frameworks will provide a means to recognize and bring to the fore the voices of these professional OEs to reveal quantitatively and qualitatively how their personal development influences how they view themselves, their contributions to, and positioning within the educational ecosystem.

## **CHAPTER 3**

### **METHODS**

Considering the paucity of quantitative measures on OEs' positional identity in educational spaces, it is necessary to develop a valid and reliable survey instrument to generate quantitative data and add to the existing knowledge base. To ensure the relevance and utility of the instrument and the resulting data, the present study was conducted in three phases. The first phase included the development and validation of the instrument within an SEM. In the second phase was the analysis of the quantitative data generated from the validated instrument. In the third phase qualitative phenomenological data was gathered to provide contextual meaning to the quantitative findings. The methods of each phase are discussed below.

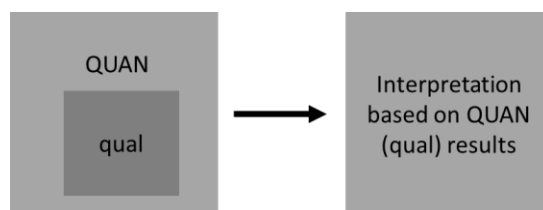
#### **Research Design**

The current study utilized an embedded instrument development mixed methods design (Creswell & Plano Clark, 2011) to create valid and reliable measures of OE identity within the educational ecosystem (Figure 3.1). An embedded mixed methods design is used when research questions cannot be addressed within a purely quantitative or qualitative study. In survey development, the qualitative data provide meaning and context to the quantitative measures to ensure that the instrument being developed is relevant and representative of the population for which it is investigating. A mixed methods approach is ideal for exploratory research as it encompasses both the comprehensive depth of a qualitative study as well as the ability to generalize finding to the broader population that is possible in a quantitative analysis (Chen, 2006; Creswell & Plano Clark 2011). When developing a survey instrument, an embedded instrument development design (Plano Clark, 2009) is recommended as it allows the researcher to gather qualitative information directly from the population being studied to provide supporting

evidence that the instrument measures accurately represent the voices and perspectives of the participants and is a valid, trustworthy measure of the phenomenon under study (Creswell & Plano Clark 2011).

### Figure 3.1

#### *Embedded Mixed Methods Research Design*



In an embedded design the supplemental qualitative data collection can occur either before, during, or after the quantitative portion. In survey development it is often collected during the piloting phase to provide insight into the content of the measures being developed (Hilton et al., 2001; Plano Clark & Galt, 2009). In the present study, the qualitative data were collected as the instrument was being developed and tested during the exploratory (piloting) phase. In addition to supporting the survey instrument development, the qualitative data were used to explore the personal background and lived experiences of the OEs. Both the qualitative and quantitative data provided insight to describe the OEs' views regarding their contributions to the educational ecosystem. The following research questions guided the study:

**RQ1: How do outdoor educators' personal backgrounds influence their personal identities?**

**RQ2: How do outdoor educators describe their pedagogical goals and positionality within their professional organization?**

**RQ3: How are outdoor educators' professional identities recognized?**

- How do outdoor educators perceive their professional position within the broader OE professional community?

- How do outdoor educators describe their positional identity in relation to formal educators?

## **Quantitative Methods**

The goal of the quantitative component of the present study was to develop and validate a research instrument to generate measures of OEs' positional identities within the educational ecosystem. The initial phase was to validate the instrument by conducting factor analyses within a structural equation model (SEM). In the second phase, the quantitative results generated from the validated survey were summarized using descriptive statistics to explore the constructs of OEs' identity.

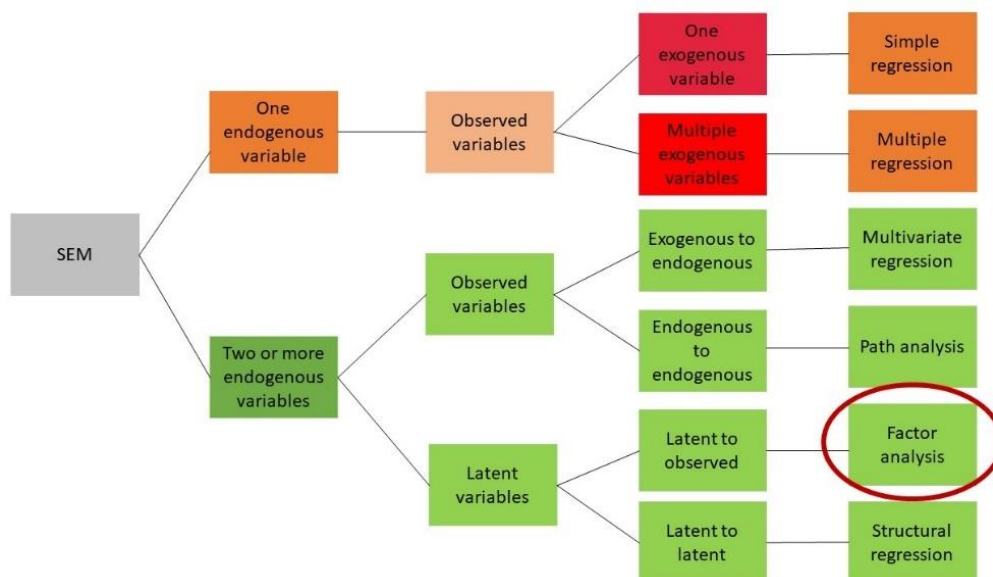
### ***Structural Equation Modeling***

Structural equation modeling (SEM) was chosen as a measure for survey instrument validation because it includes a group of robust statistical procedures that are appropriate for multivariate analyses and uses a confirmatory approach (Marsh et al., 2014; Powell et al., 2011). As a general framework, SEM has for decades been one of the most commonly used techniques in survey analysis because of its ability to reduce complex datasets to a smaller, discrete number of factors to uncover underlying constructs (Goodwin, 1999; Marsh et al., 2014; Weston & Gore, 2006). SEM is a hybrid of factor analysis and path analysis. It has characteristics of factor analysis in that it allows for developing a parsimonious model summarizing the relationships between the underlying latent variables and their measures, and characteristics of path analysis as it can identify and measure pathways to test the hypothesized relationships between constructs (Savalei & Bentler, 2006; Weston & Gore, 2006). The advantage of SEM over other analytical models is that it is able to address measurement specific errors (Weston & Gore, 2006); model relationships between the items, the constructs, and the measurement errors; and can be used to measure goodness-of-fit of the model to the sample data (Atkinson et al., 2011; Powell et al.,

2011; Savalei & Bentler, 2006). SEM is comprised of a large family of statistical modeling which can be utilized for myriad analyses depending upon the hypothetical model and theoretical framework. In this study, SEM was used for confirmatory factor analysis (Figure 3.2) to validate how well the observed variables (survey items) measured the hypothetical latent variables (identity constructs).

### Figure 3.2

*Diagram of the Family of Structural Equation Model (SEM) Analyses (Adapted from UCLA, 2020)*



The survey validation was conducted in two phases. The first phase consisted of an initial exploratory (pilot) survey which was distributed to a local population sample consisting of OEs within North Carolina to validate model fit and define the factor structure. The second phase consisted of administering a confirmatory survey which was distributed to a national sample of OEs to assess reliability and stability of the model and ensure that the initial model results are context independent and temporally reliable.

### ***Exploratory (pilot) Survey***

**Sample Population.** The instrument was distributed to a local test population of participants who are currently OEs affiliated with Environmental Educators of North Carolina (EENC). For the purposes of this study, the term outdoor educator (OE) is defined as *a professional who shares their knowledge, skills, and experiences with learners in outdoor, natural spaces outside of formal classrooms*. EENC provides a broad pool of participants as it is active throughout the state of North Carolina. The organization began in 1990 as a space for environmental educators across the state to meet and share their experiences, professional goals, and teaching tools. It includes a network of environmental educators who work together to build connections and provide professional development to promote high quality environmental education ([eenc.wildapricot.org](http://eenc.wildapricot.org)). This pilot sample was purposely drawn from a population of local participants to provide a different sample pool than will be used to administer the confirmatory survey. According to DeVellis (2017) and Hinkin (1998), using different sample populations for validation of a new instrument is paramount to ensure that results are reliable and not sample specific.

**Sample Size.** Structural Equation Modeling (SEM) is sensitive to sample size, however, there is no set number convention to determine the optimal sample size. Sample size depends on a constellation of considerations such as the robustness of the relationship among the variables with the factors, the number of factors, and method of factor estimation (Kyriazos, 2018; Pendergast et al., 2017). The sample size has an impact on the precision of the statistical estimates; if the sample size is too small, it can lead to instability in the model, overestimation, and faulty solutions and model fit. The more complex the data structure the larger the sample size must be for accurate estimations (Kyriazos, 2018; Watkins, 2018). There are various

published guidelines that have been suggested including (a) minimum of 100-200 participants; (b) 5-10 items per construct; (c) at least 10 items per construct. Each is model specific and there is not a standardized method to fit all cases (Kline, 2016; Kyriazos, 2018; Pendergast et al., 2017; Wolf et al., 2013).

Wolf et al. (2013) suggests using the Monte Carlo method, in which the researcher simulates different sample sizes until a size is achieved that produces the statistical power necessary to draw meaningful conclusions. Kline (2016) discusses the use of power analysis as a procedure to determine adequate sample size. However, there are significant limitations to each of these methods as they do not account for specific model properties. The calculations underlying each of these methods depends on which fit indices one uses. Different indices produce different results because (a) different fit statistics reflect different aspects of model fit and (b) there is little direct correspondence between the various fit statistics, degrees of freedom, and types of model misspecifications. Therefore, there is no definitive test to determine sample size to achieve the desired power. Kim (2005) reviewed different fit indices including root mean square error of estimation (RMSEA) and comparative fit index (CFI) in relation to power and sample size and found that minimum sample sizes varied widely based on observed variables, model degrees of freedom, and magnitude of covariation among variables. Wolf et al. (2013) warns of similar concerns.

A significant limitation of power analyses is that they are often based on best-case-scenario assumptions which rely on educated guesses and often result in under or overestimation of needed sample size (<https://stats.idre.ucla.edu>). However, adequate sample size is necessary to ensure that the data have enough statistical power to detect differences. The power level = .8 has been shown to ensure that a test will detect an effect if one actually exists. Eighty percent

represents a reasonable balance between alpha (Type I) and beta (Type II) risk, meaning that there is no more than a 20% probability of making a Type II error (false negative) (Cohen, 1992; Cross, 2019). To address the inherent limitations of a priori (prospective) power analysis, the present study followed the recommendation of Kline (2016) and conducted a post hoc power analysis to assure that the model attains adequate predictive power. This requires the input of sample size, degrees of freedom, and RMSEAs to calculate the power of a particular model (MacCallum et al., 1996). To perform a post hoc power analysis, the power analysis function in R (R studio, version 4.0.4, 2021-02-15) was used to input the observations from the exploratory (pilot) survey dataset to calculate the minimum threshold for the final sample size (Kline, 2016).

**Recruitment Protocol.** A request to participate in the exploratory (pilot) survey was sent via the EE certification and the North Carolina Department of Environmental and Natural Resources (NCDENR) listservs describing the purpose of the study and explaining how the OEs' participation would aid educational researchers in understanding OEs contributions in educational spaces (see Appendix A). Requests to the listservs were sent at two-week intervals for a six-week period. The first request was posted on June 28, 2021, the second on July 12, 2021. The final request was sent to the listserv and social media (Facebook and Twitter) on August 6, 2021 (see Appendix C). The last request indicated that the survey would close on August 11 at 5:00 p.m. Participants were notified that they had an option to be entered into a \$50 Amazon gift card drawing as a thank you, not an incentive, for their participation (see Appendix C). Research has shown that offering nominal material incentives does not significantly increase participation rates (Bosnjak & Tuten, 2003; G6rritz & Wolff, 2007; Laguilles et al., 2011). Laguilles et al. (2011) suggest it may serve as a motivation for the "chance" to win a prize, but they found that participants were more motivated by interest in the subject than by material

incentives. They found that material motivation would most likely require significant sums of money to have an effect on participation.

**Content Validity.** As the sample population and recruitment protocol were being established, the survey items were tested for content validity. The first step in survey development is to ensure that the content is valid and relevant to the population under study. This included several steps. First, a hypothetical model was developed for which to base the measures. Then items were generated to measure the hypothesized latent constructs within the model. The survey items were then presented to a group of educators to engage in cognitive interviews to test the psychometrics of the measures. Finally, the items were presented to an expert panel of current and former OEs to review and ensure content relevance and adequacy before the items were input into the exploratory (pilot) survey.

**Construct Validity and Instrument Reliability.** To verify that the instrument (see Appendix D for exploratory survey items) was measuring the constructs for which it is intended, data structure was analyzed using R studio (version 4.0.4, 2021-02-15). First, the data were summarized, and descriptive statistics (mean, standard deviation, kurtosis, and skewedness) were calculated. The survey was configured in Qualtrics (Qualtrics.com, 2021) to require all items to be answered to ensure there would be no missing data that could introduce measurement error (Roth, 1994). Both inter-item correlation and item-to-total correlation were analyzed using polychoric and Pearson's correlations. The Kaiser-Meyer-Olkin (KMO) test was used to determine sampling adequacy and suitability for factor analysis (Hadi et al., 2016). The Kaiser criterion (eigenvalues over 1.0) and a scree test were used to determine the number of factors (DeVellis, 2017). Polychoric correlations were assessed as this type of correlation has been shown to be a more accurate measure than Pearson's for analyzing ordinal scale items (Holgado-

Tello et al., 2010). Exploratory and confirmatory factor analyses were then conducted to assess the validity and reliability of the instrument.

**Exploratory Factor Analysis.** Exploratory factor analysis (EFA) was conducted in R using the *nfactors* package. EFA is the initial step in model development as it does not require any a priori specification of factors and is unrestricted; it is able to generate all possible solutions as every item is allowed to regress on every factor. It can be used to explore underlying patterns in a dataset to help define how items and constructs relate, which is particularly important when new and novel theories are being developed (Knekta et al., 2019). To determine the most appropriate factor structure, a scree plot (Cattell, 1966), eigenvalues, and factor rotations were assessed. This process was conducted to investigate communality, the proportion of shared variance explained by each factor and pattern coefficients, to aid in data interpretation (DeVellis, 2017; Jones & Bartlett, 2015). These processes provide information to refine the survey by identifying items with high loading on a factor while eliminating items that do not load or correlate with other items (Kline, 2016).

**Factor Determination.** The first step in exploratory analysis is to determine the factor structure. In this procedure a replicated correlation matrix is calculated, resulting in a number of eigenvalues and a scree plot to determine how many factors are needed to capture the maximum amount of information. An eigenvalue represents the amount of information captured by a factor. The eigenvalue rule suggests retaining factors that capture more than 1. As any item that captures less than 1 explains less information than an average item and is not a valid measure (DeVellis, 2017).

**Factor Rotation.** Factor rotation is utilized in EFA; as it is an exploratory model it is not yet identified and there are no unique sets of estimates for each factor (Kline, 2016). EFA uses

rotations that start with orthogonal, uncorrelated (varimax) solutions which seek to find the maximum variance of the squared loading for each item and then mathematically alters them by rotating them on different axes to provide different vantage points in which the factor structure may be more interpretable. It is then able to detect if latent variables correlate in a given spatial plane. If the factors demonstrate correlation, or overlap, an oblique rotation is applied (Dean, 2009). The purpose of rotation is to increase interpretability by identifying clusters of variables that can be characterized and grouped through their intercorrelations to a latent variable (DeVellis, 2017). The intention of factor rotation is to identify the smallest number of hypothetical constructs that can explain the covariation of the measured variables (Watkins, 2018). Both oblique and varimax were analyzed, oblique rotation did not alter factor structure and items were statistically independent so the varimax rotation was selected.

***Factor Loading and Item Retention.*** After items had been reduced based on the results of the eigenvalues and scree plot, items that loaded at or above the .4 threshold were retained (Ford, 1986; Jones & Bartlett, 2015). A factor loading is determined by the correlation of an item to a factor. Items that loaded on multiple factors or had low factor loading were excluded from the model. Cronbach's alpha was calculated to analyze the reliability and internal consistency for items within and among each subscale. Alpha values are considered acceptable at  $>.6$ , good at  $\geq .7$ -.8, and values  $\geq .9$  are considered excellent (Daud et al., 2018; Taber, 2018). Values above .7 are considered to have high reliability for exploratory measures (Bernardi, 1994).

**Confirmatory Factor Analysis.** After items were reduced, they were analyzed with confirmatory factor analysis (CFA) within the SEM to ensure the instrument measured the constructs it is intended to measure and to determine internal consistency and goodness of fit (Clark & Watson, 1995b; Pendergast et al., 2017; Weston & Gore, 2006). The chi-square test is a

standard goodness of fit statistic, however, the chi-square statistic is sensitive to sample size and in large samples it is almost always significant at the .05 level (Worthington & Whittaker, 2006). Because chi-square is not a reliable fit test, more specific measures are commonly used to measure goodness of fit, these include (a) the comparative fit index (CFI) which is an incremental fit index that measures the relative improvement in a model fit by comparing “null” baseline model with the researcher’s proposed model as seen in (1) and is measured on a scale of 0 to 1 with  $\geq .90$  indicating an acceptable/good fit and  $\geq .95$  as an excellent fit (Hu & Bentler, 1999; UCLA, 2020).

$$CFI = \frac{\delta(\text{Baseline}) - \delta(\text{User})}{\delta(\text{Baseline})} \quad (1)$$

(b) Tucker-Lewis index (TLI), another incremental fit index, which is analogous to  $R^2$  and compensates for model complexity, as seen in (2) (UCLA; 2020).

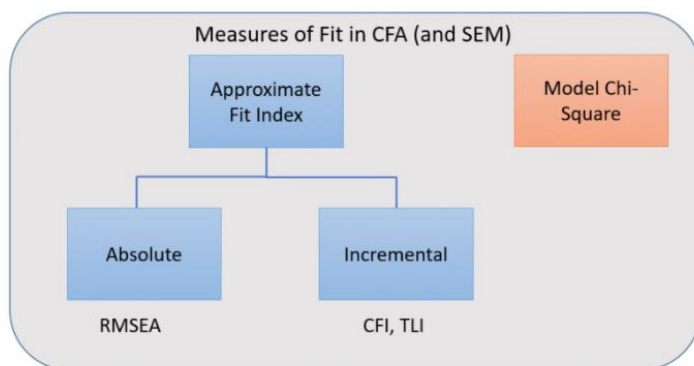
$$TLI = \frac{\chi^2(\text{Baseline})/df(\text{Baseline}) - \chi^2(\text{User})/df(\text{User})}{\chi^2(\text{Baseline})/df(\text{Baseline}) - 1} \quad (2)$$

TLI is also measured on a scale of 0 to 1, with  $\geq .90$  indicating an acceptable/good fit and  $\geq .95$  as an excellent fit (Hu & Bentler, 1999); (c) standardized root mean square residual (SRMR) provides an average difference between the sample and predicted correlation matrices with a range between 0 and 1. Values  $\leq .1$  are acceptable and  $< .05$  are a good fit (Hu & Bentler, 1999) and; (d) root mean square error of approximation (RMSEA) which is an absolute fit index and explains how well an SEM explains the relationships among the data in a hypothesized model. RMSEA is a measure of a lack of fit, so as the fit increases, the RMSEA decreases (Knekta et al., 2019; Worthington & Whittaker, 2006) RMSEA is measured similarly to SRMR with a range between 0 and 1. Values between .08-.05 are acceptable and  $< .05$  are an excellent

fit (Hu & Bentler, 1999). Each of the above metrics were evaluated to assess absolute and incremental model fit as seen in Figure 3.3.

### Figure 3.3

*Fit Indices for SEM Validation (UCLA, 2020)*



### *Confirmatory Survey*

After factor loadings and model fit were assessed in the first exploratory (pilot) survey, the survey was modified and administered to a new sample population to validate and assess the reliability of the model structure. According to DeVellis (2017) it is important to replicate the analysis using an independent sample to ensure that the results are not a one-time chance occurrence. He further explains that EFA is a more rigorous replication test than CFA due to its unrestricted nature, therefore, it is a preferred test of reliability than relying on CFA alone. If different samples in different contexts can produce the same factor analytical structure using exploratory approach, the likelihood of the results occurring by chance are very small, whereas SEM based approaches using CFA alone are merely affirming the relationships among variables that are specified and a priori. If results are replicated without such predetermination, this provides strong assurance of true reliability. Therefore, a second distribution of the survey was administered to a national pool of OEs, and the evaluation and analysis process described above

was repeated to both confirm the results of EFA and CFA obtained in the initial exploratory survey and to test for both temporal and contextual reliability.

**Recruitment Protocol.** The second confirmatory survey was distributed to a national sample population of OEs. Requests for participation were distributed to OE institutions via email request which included a description of the purpose of the study and an explanation of how participation in the study will aid educational researchers and their understanding of OEs' contributions to educational spaces (see Appendix E). Participants were actively recruited from September 20, 2021- October 15, 2021, from organizations that are located in each of the five geographic regions (Figure 3.4) of the United States (National Geographic, 2021).

**Figure 3.4**

*Map Delineating the Five Geographic Regions of the United States*



Organizations targeting different regions of the United States were contacted to maximize diversity of responses and challenge the reliability of the model to ensure that the results of the North Carolina exploratory survey were not context dependent (DeVellis, 2017). The list of organizations contact can be seen in Table 3.1 below.

**Table 3.1***List of Organizations Participating in the National Confirmatory Survey*

| <b>Name</b>   | <b>Mission</b>  | <b>Location</b> |
|---|---|-----------------|
| ANJEE (Alliance for New Jersey Environmental Education)                           | To envision a time when people will embrace their place in the natural world, understand that human health is dependent on a healthy environment and have the skills they need to enjoy their environment and protect it for present and future generations.    | NJ              |
| BEETLES (Better Environmental Education, Teaching & Learning & Expertise Sharing) | A collection of passionate science and environmental educators devoted to improving the quality of outdoor science education.   | CA              |
| CAEE (Colorado Alliance for Environmental Education)                              | The Colorado Alliance for Environmental Education is the professional organization for environmental educators in Colorado. We serve environmental education providers across the state in driving excellence, fostering collaboration, and mobilizing support. | CO              |
| Children & Nature Network   | To increase equitable access to nature so that children—and the natural world—can thrive.   | MN              |
| FIELD Edventures  | To connect with educators to explore the outdoors, foster inquiry, and engage learners through discovery.   | WI              |
| LEEF (League of Environmental Educators of Florida)                               | LEEF advances environmental literacy and promotes stewardship through excellence in environmental education.  | FL              |
| Maryland Department of Education (Environmental Literacy)                         | Division of Curriculum, Instructional Improvement, and Professional Learning.   | MD              |
| Muddy Sneakers  | To awaken in children a deeply felt connection with the natural world that inspires curiosity, stimulates learning, and brings new life to classroom performance.   | NC              |

**Table 3.1***(continued)*

| <b>Name</b>  | <b>Mission</b>  | <b>Location</b> |
|--|---|-----------------|
| NAAEE (North American Association for Environmental Educators) | To use the power of education to advance environmental literacy and civic engagement to create a more equitable and sustainable future. | Nationwide      |
| Outdoor Educators of Color                                     | The purpose of this group is to explore the unique needs and experiences of educators of color working in outdoor spaces.               | Nationwide      |

***Quantitative Data Analysis***

After the confirmatory model from the national sample was validated to confirm that the items were measuring the constructs of OE identity as hypothesized and that the model was stable and reliable, the JMP Pro 15.2.0 (2019) statistical program was used for the analyses of the validated results. As there is debate in the literature of whether survey data should be evaluated as parametric or nonparametric, both procedures were tested. Comparisons of means were first analyzed using the nonparametric Wilcoxon Rank Sums test and the Kruskal-Wallis Tests to compare means of independent groups (Natarajan et al., 2012; van Doorn et al., 2020). The results were then compared with the parametric ANOVA and paired t-tests. The results of both analyses were equivalent with minor numerical but no statistical differences. Only the results for the ANOVA and t-tests were retained to maintain consistency with the parametric analyses conducted in R that were used to determine the factor structure in the model. After mean differences were identified among responses, Cohen's  $d$  was calculated to evaluate the effect size (Table 3.2). The  $p$  value from the ANOVA and t-tests is able to provide information to identify if a statistically significant effect exists, however, it cannot provide information regarding the magnitude of the effect. Effect size is also independent of sample size as it is

calculated as the standardized difference between two means and is measured in standard deviation units. Both substantive and statistical significance are essential in providing confidence and validity of one's quantitative results (Sullivan & Feinn, 2012).

**Table 3.2**

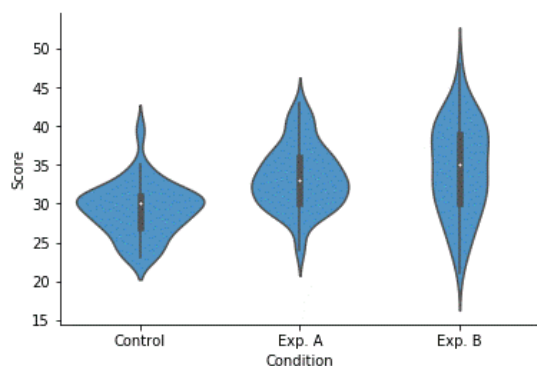
*Cohen's d Level of Significance for Effect Size (Sullivan & Feinn, 2012)*

| <b>Level of significance</b> | <b>Effect Size</b> |
|------------------------------|--------------------|
| Small                        | .2                 |
| Medium                       | .5                 |
| Large                        | .8                 |
| Very large                   | 1.3                |

To visualize the spread of the data points, a violin plot was constructed to evaluate the frequency distribution of each item response, provide further descriptive information regarding the range of responses to each item, and compare distributions between multiple groups (Figure 3.5). The plot visualizes the distribution of the data using a density curve. The width of the plot correlates with the frequency of the data points within each region (Yi, 2019).

**Figure 3.5**

*Example of Violin Plot (Yi, 2019)*



### ***Ethical Considerations***

Internal Review Board (IRB) protocol was followed to protect the rights of all participants. Prior to the survey distribution IRB granted approved (#24091) for the study. Before being able to access the survey participants were required to answer a series of screening questions to ensure participants met the criteria for the study. Utilizing the skip logic in the Qualtrics platform, if participants answered “No” to any of the questions they were navigated to the end of the survey. If they passed the screening, they were then asked to read the conditions of the survey (see Appendix F) and click on an “I agree” radio button which led to the survey contents. The survey responses were made anonymous by enabling the option to include no link to IP address of the respondent. The names for the gift card drawing were not connected to the survey responses to ensure independence and anonymity.

### **Qualitative Methods: Phenomenology**

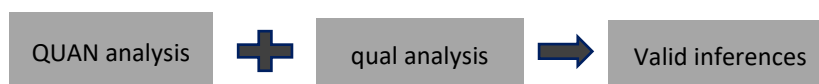
To provide context and ensure the relevance of the survey items in an instrument being developed it is necessary to include a qualitative analysis of the phenomenon under study (Creswell & Plano Clark, 2011). Additionally, as much of the past research in environmental education has been oriented towards measuring educators’ instructional practices, student outcomes, and pro-environmental behaviors (Nazir, 2016) education researchers suggest the need for increased qualitative inquiry-based research to provide a more nuanced understanding of the lived experiences of outdoor educators (Foran, 2005; Nazir, 2016). In Nazir’s (2016) investigation of the history of environmental education research, she discusses that the methodological research base has been limited and would benefit from a more philosophical exploration. Nazir (2016) suggests that quantitative research alone cannot adequately investigate educational phenomena and education research would benefit from more textured qualitative

approaches. Phenomenological analysis is one such methodology that is little used but cited as being increasingly important to provide insight and examine lived experiences of educators (Foran, 2005). Through intentional reflective analysis, a phenomenological study can reveal new insights through participants' memories, thoughts, and feelings in a deeper, more dynamic way than can be achieved with positivist quantitative methodologies such as experimental, survey, and other correlations designs (Nazir, 2016; van Manen, 1997).

In the present study, a qualitative phenomenological study was conducted during the exploratory piloting phase of instrument development to provide insight and contextual meaning to the constructs identified in the exploratory factor analysis and provide data to be used as supporting evidence to ensure that the instrument adequately represents the voices of the participants (Creswell & Plano Clark 2011). Figure 3.6 illustrates the supportive role of the qualitative analysis to validate the quantitative measures in an embedded instrument development mixed methods study design.

### Figure 3.6

*Supplemental Qualitative Analysis in an Embedded Instrument Development Mixed Methods Study*



There are several approaches to a phenomenological study. This study employs a hermeneutic phenomenological methodology. van Manen (1997) describes hermeneutics as an approach to phenomenology that aims to critically analyze lived experiences through language. In phenomenology, evidence is comprised of first person reports of lived experiences. van Manen (1997) suggests that through discourse and voice, the meaning of an experience can be

revealed. He recognizes that essences are not finite or categorical but rather a complex collection of qualities that are subject to context and subjectivity. The interpretation of lived experiences seeks to uncover the quality and the essence of the experience, not to determine causal or predictive relationships.

### ***Sample Size***

As a phenomenological study is concerned with explicating the essence and the depth of lived experiences rather than claiming to represent an exhaustive sample there is not a definitive recommendation regarding adequate sample size (Ellis, 2016; Khan, 2014; Sloan & Bowe, 2014). Ellis (2016) suggests that a samples size of 6-12 is sufficient for developing an understanding the essence of a phenomenon within a particular context. Starks & Trinidad (2007) and Creswell (1998) recommend a sample size of 1-10. Noon (2018) suggests that 4-10 is adequate. Creswell (1998) and Sloan and Bowe (2014) suggest that specific size is unimportant, however, samples should be small and purposeful. The intention is for responses to be insightful and relevant, so they are able to elucidate and provide meaning to an experience rather than simply report a representative account of a generalized population (van Manen, 1997).

### ***Participants***

This phenomenological study included nine OEs from across the United States (Table 3.3). The participants were required to fit the study's definition of outdoor educator, "*a professional who shares their knowledge, skills, and experiences with learners in outdoor, natural spaces outside of formal classrooms.*" Through purposeful sampling (Patton, 2002) OEs who and had been working in the profession for more than three years were chosen to participate in the study. The professional experience level of the participants ranged from three years to greater than 10 years. Five respondents identified as male and four identified as female.

Interview participants were selected to represent a similar racial/ethnic ratio of the survey participants. Seven interview participants identified as White (78%), one identified as African American (11%), and one identified as Latino (11%). Participants were selected for their diverse professional positions. Their willingness and ability to provide detailed descriptions of their experiences were assessed by a short pre-interview informal conversation (Kahn, 1997; Merriam & Tisdell, 2016; Sloan & Bowe, 2014; Starks & Trinidad, 2007)

**Table 3.3**

*Table of Interview Participants (Pseudonyms are used here and throughout.)*

| <b>Pseudonym</b> | <b>Professional Title</b>                   | <b>State</b> | <b>Type of Organization</b> |
|------------------|---|--------------|-----------------------------|
| Cory             | Park Ranger                                 | NC           | Government                  |
| Jordan           | Garden teacher                              | CA           | Non-profit                  |
| Carson           | Aquarium educator/supervisor                | MA           | Aquarium                    |
| Avery            | Owner/lead educator Nature Programs, LLC    | NC/CA        | For-profit                  |
| Alex             | Advanced Park Ranger                        | NC           | Government                  |
| Logan            | Education director, outdoor learning center | NC           | Non-profit                  |
| Jose             | Extension agent                             | FL           | University                  |
| Nicky            | Lead instructor, non-profit                 | NC/SC        | Non-profit                  |
| Quinn            | Museum ranger/garden educator               | NC           | Museum/non-profit           |

### ***Data Collection***

According to van Manen (1997), the lived experiences described by the participants in semi-structured interviews are the units of analysis in a phenomenological study. The interview protocol (see Appendix G) provides a structure, yet allows for open ended, reflective responses

(Moustaka, 1994; van Manen, 1997). Prior to the interview, an electronic consent form approved by the Internal Review Board (IRB) (#24091) asking for participants' agreement to be interviewed and voice recorded was emailed to all participants (see Appendix H). The participants suggested an appropriate time and identified their preferred interview method (in person, phone, or Zoom call). Prior to the start of the interview, the interviewees were asked if they had any questions or concerns about the process and were then asked for their verbal consent to continue.

Six interviews were conducted on the Zoom (Zoom Video Communications, Inc. Version 5.7.8) video conferencing platform and three were conducted in person at the location of participant's choice that complied with COVID-19 health and safety standards. All interviews were audio recorded with the Zoom audio recording/transcription function. In-person interviews utilized the Zoom audio function with an external microphone to take advantage of the auto-transcribe function of the Zoom platform. Each interview was anticipated to be approximately one hour, however, interviews lasted between 43 minutes and two hours. All interview transcripts were downloaded from Zoom and reviewed for accuracy by comparing the transcript with the audio file.

### *Data Analysis*

**Interpretive Process.** Interpretive analysis of a phenomenological study is an iterative and inductive process in which the researcher must first separate themselves from the data, and the data from the context. This process serves to decontextualize the text to allow for independent, objective statements to be assigned codes and units of meaning. The resulting codes must then be recontextualized to develop patterns of meaning and central themes to produce an interpretive narrative that provides a rich, deep description of the phenomenon (Starks &

Trinidad, 2007). The first step in the interpretive process is engaging in the process of *epoche*, followed by *bracketing* (phenomenological reduction), in which each statement is considered. After extracting significant statements, a meaning is independently formulated for each statement (referred to as *horizontalization*), and finally similar statements are grouped into thematic clusters and integrated to describe the essence of the phenomenon under study (Nazir, 2016; van Manen, 1997).

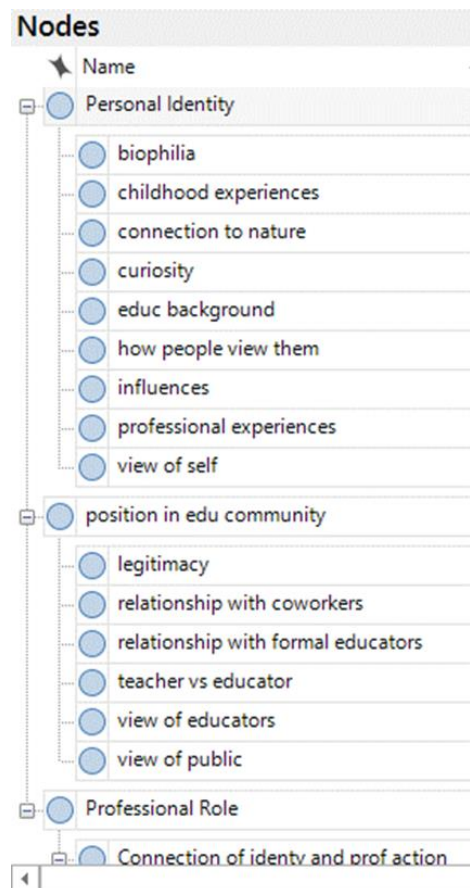
***Epoche.*** Before a researcher approaches a phenomenological study, they must first be aware of their own biases and interpretive lens. This process is referred to as *epoche*. The researcher must set aside prejudgments and biases about their own experiences. *Epoche* requires that the researcher separates themselves from the phenomenon and frees themselves from suppositions (van Manen, 1997). *Epoche* requires that the researcher refrain from judgment through inward reflection to discover the true nature and meaning of things as they appear in their essence. Only when phenomena can be seen freshly can this lead to the source of the meaning. True *epoche* is rarely achieved but it is important to practice this reflection and intentionality to acknowledge one's inherent presuppositions and assumptions. In hermeneutic phenomenology, the purpose is not to ignore biases and suppositions, but to confront and consider them as part of the data collection process (Nazir, 2016; van Manen, 1997).

As each interview was completed, the transcript was imported into the NVivo 11 (QSR International, 2017) software package for data management and analysis. The memo and annotation functions in NVivo were utilized to manage coding schemes and create an audit trail to track the interpretive process. As suggested by van Manen (1997), throughout the process of coding each transcript I engaged in the process of *epoche* and recorded my reflections and suppositions. This process included critically analyzing my emotional response to each interview

with intentionality and consciousness. When the participants' responses resonated with me, I reflected upon why, when I experienced dissonance with the participants' experiences of being an OE, I engaged in deep self-reflection and often found myself questioning, "Am I doing it [being an OE] wrong? Is there a 'right' way to be an OE? What does it mean to be an OE?" This process allowed me to recognize and separate my own suppositions from the interpretive process.

**Coding.** The subsequent coding was based on the methodology discussed by Moustakas (1994) and van Manen (1997) and guided by Colaizzi's (1978) seven step process: (a) read the transcripts several times to become familiar with the content (b) extract significant statements (c) formulate meaning (d) repeat for each transcript (e) integrate into exhaustive descriptions (f) consolidate into a concise interpretation of the experience (g) check with the participant to ensure agreement of interpretation.

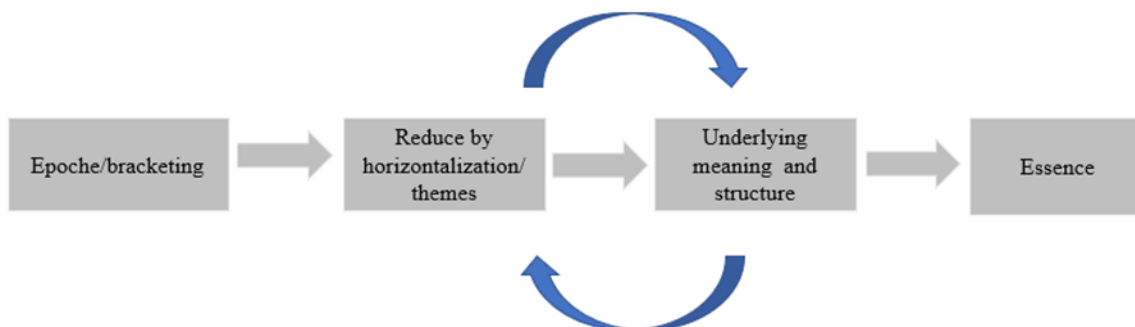
The coding process for the present study began with reading the transcripts carefully several times and selecting passages and significant statements related to OE identity formation and positionality with the educational ecosystem. Within the NVivo program, each statement was coded and classified into a subtheme which became a node (the name for a code in NVivo). Subthemes that were related were nested within hierarchal nodes that represented larger themes (Figure 3.7).

**Figure 3.7***Qualitative Coding of Nodes in NVivo*

The coding was open, while the research questions and interview prompts provided a structure for the interviews, they did not predicate or pre-determine the coding scheme. Each statement was bracketed to isolate, deconstruct, and identify the essential meaning of the statement so it could be considered on its own merit in relation to the phenomenon (Colaizzi, 1978; Moustakas, 1994; Patton, 2002). Comments were amended to the codes to describe the meaning and relevance of the code to OE positional identity. Statements that were irrelevant or redundant were removed in the process of phenomenological reduction. The extraction and reduction process were iterative (Figure 3.8) and revisited several times.

**Figure 3.8**

*Analysis Process (Adapted from Colaizzi, 1978)*



According to van Manen (1997), meaningful interpretation cannot be accomplished in one single session. It is the product of successive reflections and a constant comparison between part and whole (Nazir, 2016; van Manen, 1997). The next step in reduction included grouping statements that were similar in meaning and condensing them into larger themes (Table 3.4)

**Table 3.4**

*Example of the Reduction Process*

| Significant Statement   | Formulated Unit of Meaning            |
|---|---------------------------------------|
| Family bug walks<br>Space to spend time with friends and family<br>Family canoe trips<br>Exploring the backyard with siblings<br>Family vacations to beach and natural spaces<br>Outdoor sports with parents<br>Assisting parents with outdoor work<br>Learned that outdoors can be an escape from household/indoor chaos<br>Attending nature park programs | Being in the outdoors as family value |

The units of meaning were reconsidered and reorganized until they were reduced to essential themes and patterns of meaning related to the essence of OE identity formation. These themes

were correlated with the research questions and the five latent constructs that were measured in the quantitative model (Table 3.5).

**Table 3.5**

*Thematic Coding Chart*

| <b>Construct</b>   | <b>Theme</b>   | <b>Unit of formulated meaning</b>     | <b>Significant statement/<br/>Representative quote</b>   |
|--|--|---------------------------------------|--|
| <b>RQ1 How do outdoor educators' personal backgrounds influence their personal identities?</b> |  |                                       |  |
| Personal identity  | <i>Childhood experiences of time in the outdoors</i>                 | Family values related to the outdoors | I grew up in a family that appreciated the outdoors.   |
|  | <i>Nature as emotional support</i>                                   | Affective connections                 | The outdoors for me, growing up meant fun, joy, relaxation. Then as a teenager and a college student, anytime I felt anxiety, I went outside. It was just a natural thing for me.                                    |
|  | <i>Curiosity</i>   | Sense of wonder                       | My general personality is to be inquisitive, to wonder, to observe, and just analyze. I guess you would say, that's the part of who I am.  |
|  | <i>Connection to nature</i>  | Biophilia                             | I do think that all outdoor education speaks to the need for us as human beings to get outside and be in nature.   |
|  |  |                                       | Humans as part of the ecosystem  |
|  | <i>Complex identities: Science as attribute rather than identity</i> | Not easily labeled                    | I mean I'm a scientist from the point of view I ask questions a lot [and] I am an advocate from the point of view that I will take up a cause for sure and it usually comes back around to if something's unethical. |

Table 3.5

*(continued)*

| Construct  | Theme  | Unit of formulated meaning  | Significant statement/<br>Representative quote  |
|--|--|---|---|
| RQ2. How do outdoor educators describe their pedagogical goals and positionality within their professional organization? |  |   |   |
| Organizational position  | <i>Influential experiences that led to OE as an identity</i> | Recognizing their own privilege of being in nature and wanting to share with others | We were on the beach and there's the ocean and so many of the kids just stood there with their eyes wide open and mouths open and I didn't know say, because I didn't know what they were doing and then it I hit me, these kids had never seen the ocean before and they live right there and for that, that meant a lot to me, you know and then recognizing my own privileges. |
|  | <i>Teaching philosophy</i>                                   | Inquiry-based teaching  | I want my programs to involve the public and not just in touching antlers and pelts, I want their brains to be involved. I want them to be thinking, actually thinking about like, why don't I see antlers after they fall off in the middle of the woods? I want them then to ask these questions themselves.  |
|  |  | Life-long learning  | When I am teaching the kids in the garden, I'm giving something that they can take with them for the rest of their lives.   |
|  | <i>Integrative, whole child education</i>                    | Nature as unifying formal learning  | My lessons are very interdisciplinary. I believe that you can use nature to learn to read and count and do all those wonderful things, and so we do. We practice life skills, while studying nature... I don't think they have to be separate.  |

**Table 3.5***(continued)*

| <b>Construct</b>   | <b>Theme</b>   | <b>Unit of formulated meaning</b> | <b>Significant statement/<br/>Representative quote</b>  |
|--|--|-----------------------------------|---|
|  | <i>Responsibility to educate about environmental literacy</i>          | Teaching for the future           | We have this sense of responsibility for keeping this environment protected, and therefore the future and trying to teach for tomorrow's leaders.   |
|  | <i>Spreading learners' joy and inspiring "Aha!" moments</i>            | Motivations                       | Seeing those light bulbs, it's those kinds of moments that I want to help create because those are the moments that I remember as a kid.  |
|  | <i>Providing experiences to connect students with nature</i>           | Professional goals                | Part of my desire for, to get kids out in nature [and] to get kids engaged in science is that I know that my experience as a child is not the norm, and it should be. I want more kids to have the experience of feeling safe in the woods. |
| <b>RQ3: How are outdoor educators' professional identities recognized?</b> |  |                                   |   |
| Professional legitimacy  | <i>Relationship with formal educators</i>                              | Different worlds                  | I think sometimes there is a disconnect between formal educators and informal educators, and so, even if they are supportive, they might not know how to bridge that gap between their experiences.   |
|  |  | Respect for teachers              | I have such deep respect for classroom teachers. Part of why I am not a classroom teacher is that I could not do that work.   |
|  | <i>Lack of cultural understanding of outdoor learning in education</i> | Awareness                         | [I get] a variety of responses. Responses like, "Oh that's cool. What does that mean?" and, "You do that for a living? You get paid to do that?"  |

**Table 3.5***(continued)*

| <b>Construct</b> | <b>Theme</b>  | <b>Unit of formulated meaning</b> | <b>Significant statement/<br/>Representative quote</b>  |
|------------------|---|-----------------------------------|---|
|                  | <i>Challenges to accomplishing professional goals</i> | Classroom standards               | It was much harder for teachers to justify taking instructional time for something that wasn't technically content. They think there's still value to it, but it was not considered instructional time. |
|                  |   | Cultural imbalance                | It takes longer for me to gain the respect as a Latino person because they usually see a Latino as the field worker.  |

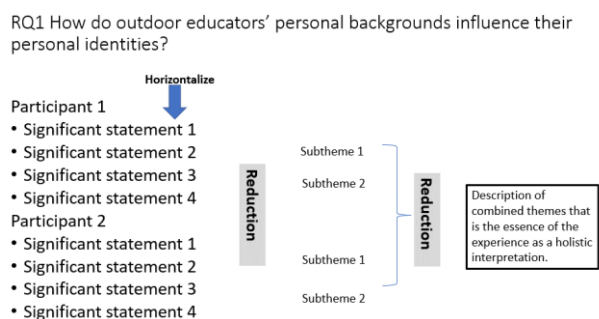
Finally, the themes were consolidated, and a holistic interpretation of the data was derived and synthesized into a final narrative of the phenomenon of, “What is the positional identity of OEs within the educational ecosystem?” The interpretation included the textural (what the participants experience) and the structural (the context and conditions) description of the experience and essence of being an OE (Colaizzi, 1978; Creswell & Poth, 2017).

**Validity and Reliability.** Ensuring credibility and trustworthiness is paramount in qualitative research. Calculating interrater reliability, or consistency of interpretation among multiple researchers, is a common practice in qualitative studies. Due to the subjective and dynamic nature of phenomenology this procedure is not widely utilized. In phenomenological research, bracketing (isolating statements from the context) is the primary process to ensure objectivity of interpretation (Starks & Trinidad, 2007; van Manen, 1997). In the present study, to ensure validity and reliability, a modified application of the interrater reliability process was employed to ensure adequate bracketing and suspension of judgment in the interpretive process (Figure 3.9). Two external reviewers were given a subset of the transcripts and provided with the

three main research questions. They were then asked to extract significant statements related to each underlying theme of the research questions and reduce the statements to subthemes. The subthemes, themes, and overall interpretation were compared to assess the consistency of interpretation and for agreement of the essential meaning of the phenomenon of being an OE (Groenewald, 2004; Moustakas, 1994; Starks & Trinidad, 2007).

### Figure 3.9

#### *Interrater Reliability Process*



Validity and trustworthiness were addressed by conducting member checks with all participants to ensure correct interpretation of the data. Each participant was sent a copy of my interpretation and synthesis of their collective responses regarding the description of OE identity. Follow up phone interviews with each participant verified the fidelity of my interpretation with participant experiences (DeCuir-Gunby & Shultz, 2017; Merriam & Tisdall, 2016; Tracy, 2010). Reflexive journaling created an audit trail throughout the data collection process to increase transparency, record research methods, assumptions, and maintain conscious awareness of any personal biases that arose during data collection and analysis (Creswell & Miller, 2000; Merriam & Tisdell, 2016; Starks & Trinidad, 2007).

### ***Ethical Considerations***

IRB protocol was followed to protect the rights of all participants. Prior to the qualitative interviews, the Internal Review Board (IRB) granted approval (#24091) and electronic consent forms asking for participants' agreement to be interviewed and voice recorded were emailed to all participants prior to the interview (see Appendix H). All names of participants and institutions were assigned pseudonyms and all data were stored in a secured database on the University server to maintain anonymity and confidentiality.

### ***Limitations of Phenomenological Analysis***

A phenomenological study cannot be completely unbiased by either the researcher or the participants. It is difficult to ensure that participants present themselves objectively and free of psychological distortion (Moustakas, 1994). Additionally, regardless of how often or from what angle an experience has been perceived, there is always room for additional meaning and alternative interpretation (van Manen, 1997). van Manen (1997) recognizes that there is no final or objective meaning of an experience; the interpretation is constantly changing with time and perspective. Because of these inherent limitations, a phenomenological study cannot produce theory, only a description and understanding of an experience within a specific context (Wilson, 2015). It can never be exhaustive. No one interpretation can explicate all of the possibilities or potential descriptions of an experience. There will always be the potential for differing perceptions by other researchers and richer, deeper, and perhaps more insightful interpretations of a phenomenon which may vary due to context, orientation, and the mere subjectivity of reality (van Manen, 1997). Additionally, it is difficult for a researcher to fully achieve *epoché*; one's own lens and interpretation will inevitably be influenced by one's subjective reality (Moustakas, 1994). However, with its emphasis on deep and intentional analysis of lived experiences and the

inclusion of participants in the interpretive process, phenomenology can provide an insightful and complex layered approach to OE research that is currently lacking in the field (Nazir, 2016).

## CHAPTER 4

### SURVEY INSTRUMENT DEVELOPMENT AND VALIDATION

#### **Survey Development**

The design of the Outdoor Educator's Positional Identity Scale (OEPIS) followed the psychometric procedures recommended by the American Psychological Association (APA) and the American Education Research Association (AERA et al., 2014) suggesting that the initial step in survey development is to intentionally define measures and their objectives. APA and AERA further suggest that the validity and utility of an instrument is dependent on the evidence and theory that provide the foundation for the proposed use of instrument. The instrument itself is not the subject of validation, but rather it's the use and interpretation within a specific context that must be validated (Clark & Watson, 1995; Kane, 2016). In their analysis on conducting mixed methods research with instrument development, Onwuegbuzie & Johnson (2006) identify potential threats to internal and external validity that can occur throughout the research process beginning with item generation and instrument design through data collection, analysis, and interpretation. Some of these threats include order bias of items, mis-specification errors in model construction, and confirmation biases in analysis. Hinton (1998) suggests that the construction of a valid measurement instrument is the most important component of any study. In the development of the OEPIS instrument, each of these potential threats was carefully considered.

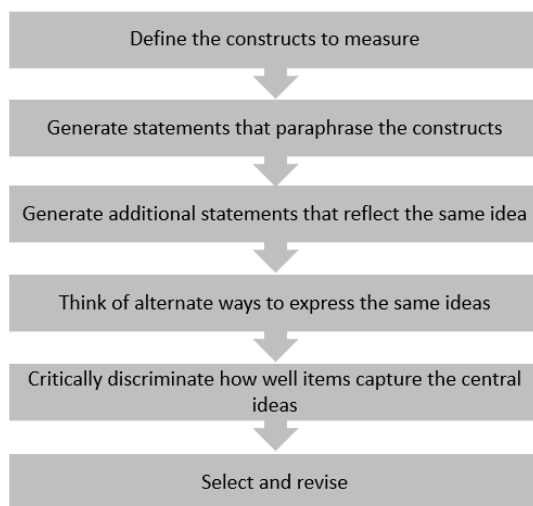
#### ***Item Generation***

In his work on scale development, DeVellis (2017) expounds upon Hinton's (1998) assertion that the definition of a construct is the guiding foundation in the development of scale items and recommends an iterative approach to item generation (Figure 4.1). The researcher

must first identify, isolate, and define the constructs which are to be measured. Then they must generate statements to express each construct in multiple ways. Finally, they must critically analyze and refine the items for relevance and how well they capture the essence of the construct being measured.

### Figure 4.1

*Scale Item Development Process (DeVellis, 2017)*



DeVellis (2017) recommends that items should be grounded in substantive theories related to the phenomenon being measured. If there is no existing theory, the researcher must create their own conceptual foundation and then operationalize it. They must construct a theoretical model to guide scale development. DeVellis (2017) and Morgado et al. (2017) recommend a combination of deductive (item generation based on literature and existing scales) and inductive (information from focus groups and interviews) methods for scale development. Clark and Watson (1995) suggest that critically thinking about the construct, both inductively and deductively, prior to scale development increases the likelihood that the instrument will be relevant and provide a contribution to the existing knowledge base of the field of study for which it is being developed.

Initial item generation in the present study consisted primarily of deductive methods. Item content was generated through the review of existing relevant literature on Gee's (2000) perspective on identity formation, teacher identity development (Akerson et al., 2014; Carlone & Johnson, 2007; Carrier et al., 2017; Choudry & Williams, 2017; Moore, 2008) and prior phenomenological and case study research on OE identity in Australia (Hill, 2010; Payne, 2001), New Zealand (Gunn, 2006), and Mexico (Fuentes Amaya, 2004). Then, as recommended by Benson and Clark (1982) and DeVellis (2017) to address content irrelevance an additional comprehensive literature review was conducted. Search terms included "Outdoor educator", "Outdoor education", "Outdoor education phenomenology", "Outdoor educator positional identity", "environmental education," "environmental educators", "environmental education in elementary education" and "teacher identity" using Google scholar, Mendeley, and ERIC databases.

Several items were adapted from existing scales measuring teacher identity. These scales included the International Teacher Professional Identity Survey (Educational Institute of Scotland, 2017), the Primary School English Teachers' Identity questionnaire (Xiong & Xiong, 2017), and Job Satisfaction Survey (Spector, 1985). These scales were chosen as they each address salient components of teacher identity discussed in the literature. The definitions of the constructs were developed iteratively following the procedure suggested by DeVellis (2017) and Clark and Watson (1995); each iteration was modified based on successive literature reviews and critical analysis of the constructs with respect to the central focus of the research questions that guided the study.

Inductive scale development was also employed as it is an appropriate method when conducting exploratory research when there is not an extant, clearly defined construct (Hinton,

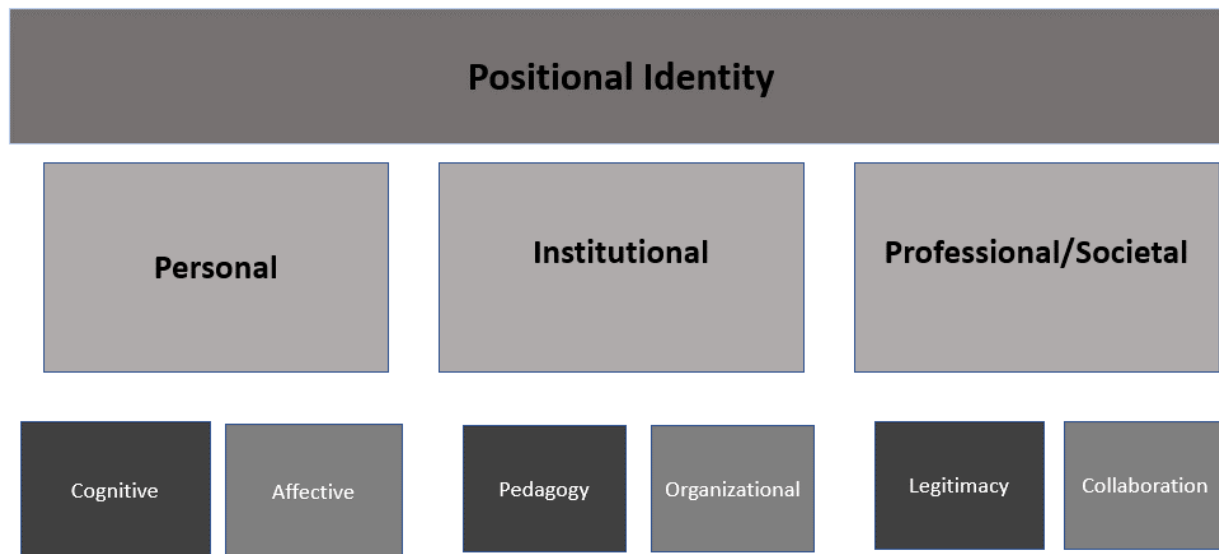
1998). In this study, items were generated from relevant content identified in focus groups with practicing OEs (Morgado et al., 2017). The synthesis of the deductive and inductive methods of item generation led to the conception of the final scale comprising of three constructs of identity: personal, institutional, and professional/societal, each with two subconstructs (Figure 4.2).

DeVellis (2017) emphasizes the importance of being clear about what is being measured to ensure that measures do not overlap with unintended constructs, however, the items should be exhaustive and clearly associated with the context of the study (content relevance). The strength of the item correlation with one another and with the latent variables being measured are fundamental characteristics of internal consistency in scale development (DeVellis, 2017; Hinkin, 1998; Worthington & Whittaker, 2006). The first iteration of the identity model was based off Gee's (2000) theory of identity considering Carlone & Johnson's, (2007) redefinition of *recognition* in identity construction. Carlone & Johnson's (2007) study on science identity of women of color resulted in a differentiation among three recognized identity groups, (a) research scientist, (b) altruistic scientist, and (c) disrupted.

The three science identity trajectories were adapted into two differentiated OE positional identity groups consisting of an affective (socio-emotional) or a cognitive (scientific, content-based) orientation. The institution construct was derived from Gee's (2000) perspective of institution identity (I-identity) to measure how the OEs were situated within their workplace both pedagogically and organizationally (politically). Finally, the societal construct, analogous to Gee's (2000) Discourse-identity (D-identity) and Affinity-identity (A-identity) was intended to measure how OEs were situated and recognized within the broader society and seen as legitimate educators and collaborators. Figure 4.2 illustrates the hypothesized model of the positional identity constructs underlying the initial phase of measure construction.

**Figure 4.2**

*Initial Hypothesized Model of Identity Constructs for Survey Development*



Forty-five items were generated for the initial scale to provide a pool from which to choose items that are true to the construct domain and most accurately represent all dimensions. DeVellis (2017) and Kline (2016) recommend a minimum of three measures for each construct to ensure adequate internal consistency. In the survey development phase, Benson & Clark (1982), Hinkin (1998), and (DeVellis, 2017) suggest generating at least twice as many items that will be needed for the final form of the instrument to ensure reliability, therefore, at least six items were generated for each subconstruct.

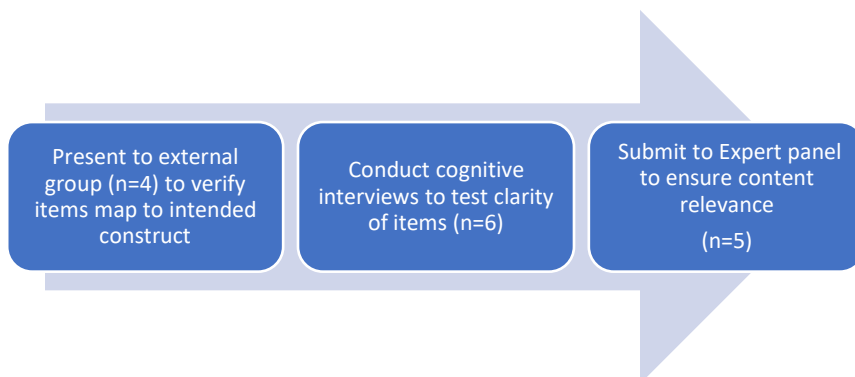
### ***Mode of Delivery***

The OEPIS scale was developed using the Qualtrics online survey platform. Qualtrics is a cloud-based platform for creating and distributing web-based surveys (Qualtrics.com). This mode of delivery was chosen as it is a cost and time effective way to distribute large-scale surveys. Additionally, web-based surveys have been documented as having several advantages over other modalities of delivery. Studies report that computer assisted surveys reduce variability

of responses compared with paper-based surveys and slow down the pace of response which correlates with more accurate reporting and increased depth of responses. Computer-based surveys have been shown to increase respondents' willingness to report sensitive information, thereby decreasing the potential for social desirability response bias (Tourangeau et al., 2000). The survey interface was designed to display only one item per page to aid in slowing response time and minimizing the potential for respondents to engage in a form of satisficing, which is the tendency for respondents to mark answers due to ease rather than accuracy. Additionally, both close-ended and Likert scale items were developed to provide variation in item construction (Spratto & Bandalos, 2020), however, the close-ended items were removed and a Likert scale was chosen. Likert scaling is widely used in instruments measuring opinions, beliefs, attitudes (Dawes, 2008; DeVellis, 2017; Johns, 2010; Joshi et al., 2015). Additionally, Hinkin (1998) suggests that Likert-type items are the best rating scale for factor analysis.

### ***Content Validation***

After item construction, the initial pool of items was subjected to multiple levels of validity testing to ensure accuracy, clarity, and relevance (AERA et al., 2014; DeVellis, 2017). This phase consisted of a three-step process. Figure 4.3 illustrates the content validation procedure. These steps were included in the item generation process as Kane (2016) states that critically analyzing the content and presentation of the items during validation maximizes the validity and relevance of each item by certifying that it is correct, and more importantly, to find the weakness.

**Figure 4.3***Content Validation Process*

**Construct Mapping.** The first step was to present the items to a small group ( $n = 4$ ) of both practicing OEs and non-OE education professionals who were asked to sort each item into one of the construct categories (personal, institutional, professional/society identities) to confirm that the items map to the appropriate constructs. Each participant was provided with the definitions and brief description and intention of each construct and a list of items. They were then asked to sort each item into the category to which they thought the item belonged (Benson & Clark, 1982; DeVellis, 2017). The respondents are not rating the substance of the content, but how well the items appeared to match the definition of the intended constructs. Hinkin (1998) describes that an agreement index should be calculated among items correctly classified. A minimum of 75% agreement among respondents for all items is recommended to ensure content adequacy. The four respondents correctly classified all except for four items. The items were reworded and reassessed until correct classification was achieved.

**Cognitive Interviews.** The second step in the content validation process included conducting cognitive interviews with general education professionals and with professional OEs to assess the content of the items and to evaluate how participants interpret each item. When

developing test items, the content of the item and the construct that an item is intended to measure must be clear (AERA et al., 2014). The importance of clarity and wording, avoiding complex and double-barreled questions, choice of item format, and potential for construct irrelevance that could lead to distorted representation of the item must be considered (Karabenick et al., 2007; Peterson et al., 2017; Spratto & Bandalos, 2020). According to the *Standards in Educational and Psychological Testing* (AERA et al., 2014), another dimension to consider is construct underrepresentation in which test items do not capture all aspects of a construct because they address too narrow of an interpretation of the concept and do not engage all possible cognitive and affective dimensions.

**Sample Size.** Research conducted to determine the optimal sample size for cognitive interviews recommends selecting a sample of between five and 15 that represents a wide range of experiences (Peterson et al., 2017). Studies have shown that smaller sample sizes expose proportionately more major errors, and as sample size increases, new problem identification decreases. Additionally, as cognitive interviews are only one component of content validity, a sample size from  $n = 5-15$  is recommended (Peterson et al., 2017). A sample ( $n = 7$ ) of education professionals were asked to review the items. The sample included education researchers ( $n = 4$ ) and former OEs ( $n = 3$ ). Each was asked to take the survey to check for clarity and quality of the items to ensure that the items address the constructs as intended and to evaluate how participants cognitively processed the questions (Spratto & Bandalos, 2020).

**Psychometric Evaluation.** Tourangeau et al. (2000) discuss the many potential errors that can occur due to the complex psychological process in which one engages when reading survey items and developing responses. This process includes features such as language comprehension, memory, and choice of which memories to retrieve before recording a final answer. An example

of the cognitive processes respondents employ as they develop their response is described below in Figure 4.4 (Spratto & Bandalos, 2020; Tourangeau, et al., 2000).

**Figure 4.4**

*Cognitive Process Model (Adapted from Spratto & Bandalos, 2020)*



To address each of the psychological processes in item response, the following questions were asked to each participant (Karabenick et al., 2007; Peterson et al., 2017):

#### **Interpreting**

- Is there anything confusing about the questions?
- What does this term/statement mean to you?
- What is the question trying to find out?

#### **Retrieving**

- Tell me what you were thinking when I asked you about \_\_\_?
- How much do you know about it?

#### **Forming Opinion**

- Can you take me through the steps of how you came to that answer?
- What information did you consider when you answered the question?
- What was your thought process as you decided on your response?

#### **Recording Answer**

- How well did that option accurately reflect what you wanted to say?
- Were there responses that you wanted to give that were not there?

- Were there any responses that did not make sense to you?

**Expert Panel.** The final step was to submit the items for critical review to an expert panel consisting of both former and practicing OEs (n = 6) to provide input, consider alternative interpretations, and verify that the intention of each item is clear. Usry et al. (2018) suggest that as few as two experts are required to establish content validity. An expert panel is essential in testing content validity to confirm or disconfirm the operationalized definitions and rate the relevance of the items as measures of the constructs, particularly with scales containing multiple constructs (Taherdoost et al., 2017). An expert panel can suggest alternate ways to measure the phenomena to maximize content validity (Benson & Clark, 1982; DeVellis, 2017), identify potential issues with construct irrelevance or misinterpretation (AERA et al., 2014; Kane, 2016), and ensure that the items appropriately and accurately capture the voices and perspectives of the intended audience (AERA et al., 2014; Clark & Watson, 1995).

The panel in the present study consisted of two practicing OEs, three university educators who are former OEs (AERA et al., 2014), and an additional educator who is not affiliated with OE but has experience with OEs from the classroom teacher perspective. Each participant in the panel was given the draft scale, and a description of the constructs they are meant to measure and asked the following questions:

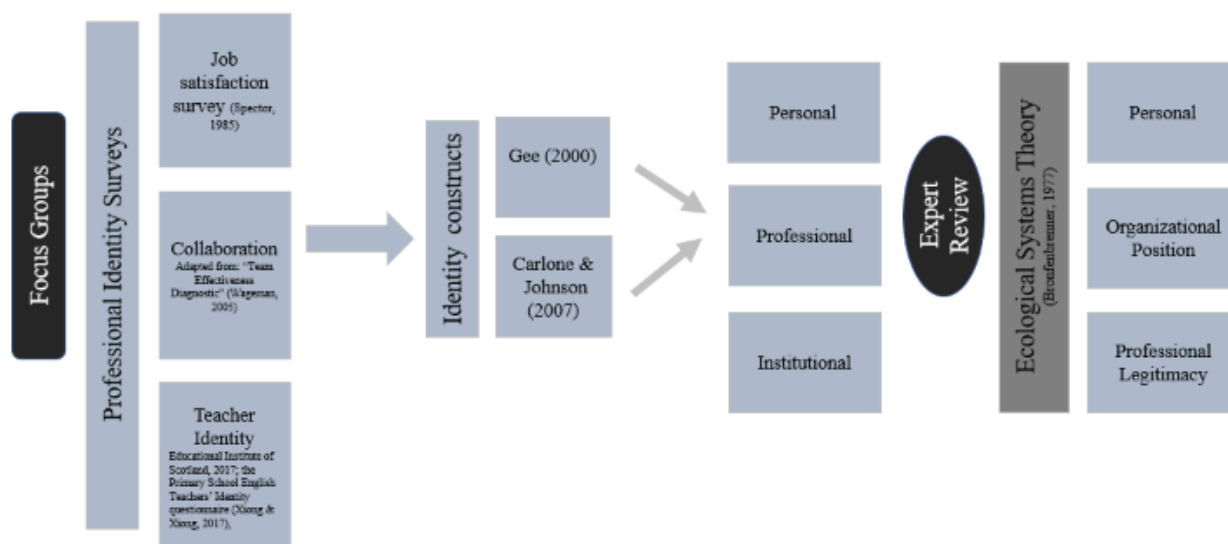
- Is the content appropriate (is it missing anything or contain any items that are irrelevant)?
- Does this resonate with your experience as an OE?
- What is the intention of this item(s)?
- Does the scale address the three constructs for which it is intended? How?
  - personal identity (beliefs, and views of yourself and of you by others)
  - professional beliefs/ identity

- positioning in broader educational systems

Interviews were then conducted to review each item with each participant. As the participants read each item aloud their responses were noted and recorded. The first round of expert panel reviews revealed that the initial constructs did not appropriately capture identity constructs relevant to the OE community. The underlying theoretical framework the initial hypothetical model was re-examined, and an additional literature review was conducted. Bronfenbrenner's (1977) ecological systems theory of human development was chosen as an appropriate theoretical foundation as it more accurately describes one's character and core identity development as a product of complex interactions within successive levels of social and environmental systems. The survey items were revised, and the scale was restructured to ensure measures reflected the OEs' core identity as postulated in Bronfenbrenner's (1977) ecological systems theory model (Figure 4.5).

**Figure 4.5**

*Revision Process of the Hypothesized Model*



### *Item Restructuring*

The results from the cognitive interviews and expert panels informed the restructuring and removal of several items. There was a consensus among reviewers that the initial items were not general enough to achieve appropriate content relevance. Respondents also commented that the items were too neutral and would not elicit a range of opinions. Additionally, the sentence structures were too complex. Research suggest that good items should be unambiguous, avoid unnecessary wordiness, be simple, and elicit varied responses (DeVellis, 2017; Hinkin, 1998; Joshi et al., 2015; Spratto & Bandalos, 2020). Examples of item modification from the first expert panel review can be found below in Table 4.1.

**Table 4.1**

*Example of Results from the First Expert Panel Review*

| <b>Item</b>  | <b>Expert Panel Response</b>                                   | <b>Result</b>           |
|--|--|-------------------------|
| I think that the programs I lead are about more than science concepts, they are also about humans' history with the natural world. | <b>Too complex, double barreled</b>                            | Simplified and retained |
| External organizations appreciate my skills and capabilities.  | <b>Too neutral, ambiguous</b>                                  | Removed                 |
| When I am in the outdoors, I often investigate or think about scientific processes.  | <b>Change "investigate" to "engage"</b>                        | Reworded and retained   |
| I see myself primarily as an environmental advocate.   | <b>Redundant sentence structure with science identity item</b> | Reworded and retained   |

**Wording of Items.** Items are recommended to be developed on a sixth-grade reading level to ensure clarity and simplicity (Bandalos, 2021; Clark & Watson, 1995; Johns, 2010). According to DeVellis (2017), the average sentence at a sixth-grade reading level has 15-16

words and total of 20 syllables. Spratto and Bandalos (2020) and Clark and Watson (1995) recommend that items avoid ambiguous pronoun references and potential for multiple meanings. Items that included double barreled meanings in which a participant is asked to consider multiple concepts in one response were eliminated or reworded. DeVellis' (2017) further recommends for items to be strongly worded to elicit a definitive opinion. The rewording of items also included strengthening each statement to elicit greater variation in responses. Mild statements elicit too much agreement or indicate an absence of belief which could lead to lack of variance and affect covariance and reliability of the scale (Dawes, 2008; Joshi et al., 2015). All items were revised to comply with these recommendations.

Additionally, the items were reviewed to verify consistency. Research indicates mixed opinions about including positive and negatively worded items in a scale (Spratto & Bandalos, 2020). While it may be desirable to include both as it avoids acquiescence and agreement bias, it has also shown to be confusing to respondents. DeVellis (2017) suggests that the disadvantages outweigh the benefits. Studies show that when items are reworded to have consistent valence, reliability dramatically improves (Clark & Watson, 1995; Eys et al., 2007). In this study all items were positively worded.

**Redundancy.** Four respondents questioned the presence of redundant items. Research indicates that including redundant items on a scale can be helpful to reveal the phenomenon in different ways (Jaju & Crask, 1999). Redundancies can cancel out idiosyncrasies in wording that might undermine the response and yield a more reliable item set. This is particularly useful in initial instrument development in which a set of items is attempting to capture a phenomenon in different ways (DeVellis, 2017). It is important that if redundant items are included, they are redundant in concept, but not in wording. If items start with the same phrase or similar

grammatical construction, this can cause items to correlate more strongly with each other and cause inflated estimates of reliability. This redundancy influences the algorithms underlying Cronbach's alpha. The researcher must be sure to not over represent a subconstruct and consequently bias reliability results (Jaju & Crask, 1999; DeVellis, 2017; Eys et al., 2007). With this in mind, items were reviewed and conceptually redundant items were retained while items with similar sentence structure were reworded or removed to reduce potential for biasing results.

**Ordering of Items.** The ordering of items was considered as research shows that the order of items can lead to a context effect and influence how respondents interpret and chose to respond to items (Bandalos, 2021; Knowles, 1988; Worthington & Wittaker, 2006). Tourangeau et al. (2000) describe that where an item is embedded within the scale changes the psychological processes with which a respondent engages to formulate their response. Bandalos (2021) found that item order affects the magnitude of correlated residuals in CFA results and recommends separating and randomly ordering items of similar wording. Considering Knowles (1988) and Bandalos' (2021) discussion on serial positioning and the cumulative effect of cognitive processing, items were presented in the survey in an arrangement that produced a logical flow and built off each other with respect to the hypothesized theoretical model.

**Number of Response Options.** The initial version of the OEPIS instrument consisted of five response options. However, respondents commented that these did not reflect the true range of their desired responses. A review of research on Likert-type scales in survey development provided guidance on the optional number of response options. DeVellis (2017) suggests that a six or seven-point scale increases the potential for variability, which is necessary for validity and reliability testing and enables participants to discriminate among response options with more precision. More than seven options do not prove meaningful and fewer than five has shown to

lead to inaccurate responses that are not a true representation of participants' beliefs. Finstad (2010) and Joshi et al. (2015) suggest a seven-point scale has shown to be more reliable and provide more accurate responses. Additionally, a seven-point scale is better suited for electronic evaluations (Qualtrics.com, 2021).

Joshi et al. (2015) found that a seven-point scale may perform better compared with a five-point scale as it provides more options which increase the probably of approximating the respondents' true orientation to the phenomenon under study, and research on memory support the notion that humans can distinguish seven categories at a time. In addition, seven-point scales alleviate the necessity of choosing between two undesirable choices that are available within a five-point scale. Joshi et al.(2015) found that due to the minimal range of choices, a five-point scale is more likely to elicit interpolation. Dawes (2008) conducted a split-sample experiment to assess the impact of scale categories on responses in Likert scale items and found no significant difference between the quality of data obtained from a five or seven-point scale and no significant difference between the five and seven-point scales in terms of standard deviation, skewness, or kurtosis. However, he did find that the increased number of options led to higher precision and more discrimination among responses.

Johns (2010) discusses that there is no theoretical foundation for the common use of a five-point scale; he suggests that five-point scales likely have become the norm because of its simplicity and balance of offering enough choices in a bi-directional scale without being overwhelming. After considering the comments from the interviewees and consulting relevant research, the response options were increased to seven response options.

### *Second Expert Review*

After reviewing the results from the first expert panel and an additional literature review, the items were revised and restructured. A second round of content validation was conducted following the procedure presented in Figure 4.3. Interviews were conducted, and the participants' comments were recorded for each item in a table to track responses and assess patterns for final modification and revision. Table 4.2 is an example of item modification resulting from the second expert panel review.

**Table 4.2**

*Example of Results from Second Expert Panel Review*

| <b>Initial item</b>   | <b>Expert Panel Response</b>                 | <b>Revised item</b>  |
|---|--|--|
| I feel that the classroom teachers are engaged with the content and the students during my lessons. | <b>Too context dependent, hard to answer</b> | I would like classroom teachers to be highly engaged with the content during my lessons. |
| I have the power to make my own decisions about programming.  | <b>The answers depended on frequency</b>     | In most situations, I have the power to make my own decisions about programming.         |
| I strive to provide meaningful educational experiences.   | <b>Too general</b>                           | The central focus of my programming is to support school-based science.                  |
| I enjoy interacting with other education professionals.   | <b>Ambiguous wording</b>                     | I feel that I belong as a part of the professional educator community.                   |

The second expert panel review resulted in a consensus that the items were relevant and representative measures of OE positional identity. After the content validation was complete, the items were imported into the survey platform to test construct validation.

## **Survey Validation**

The goal for developing the OEPIS instrument was to create a tool to develop a broad and generalizable understanding of OEs' perspectives and contributions to the educational ecosystem. Phase one of model development included administering an exploratory (pilot) survey to examine the underlying factor structure of the instrument within an SEM to confirm that it is measuring the constructs as intended. The initial instrument contained 45 items to measure personal identity and orientation to the outdoors and nature, how OEs view their professional identity as educators, and how they feel their positional identity is recognized by the general public. Seven additional demographic items were included to characterize the structure of the population of the respondents.

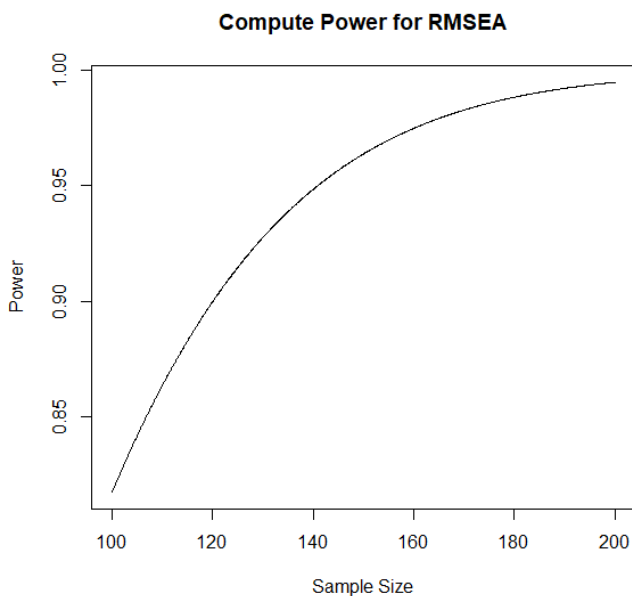
### ***Exploratory (pilot) Survey***

The exploratory (pilot) survey was distributed to OEs throughout the state of North Carolina through the NC department of Environmental and Natural Resources network of environmental educators. The initial survey instrument included a total of 52 potential items (see Appendix C). The survey responses were downloaded from Qualtrics in text format into an Excel file and converted to a number scale 1-7 (1 = Strongly disagree, 7 = Strongly agree) using the IF() logical test function. Additionally, each item was assigned a code that consisted of the abbreviated construct name appended with a number indicating the order in which the item appeared within that construct (Figure 4.6). Results were compared with original data to ensure accuracy before inputting into R for analysis.

**Figure 4.6***Table of Item Codes*

| Construct Name | Item Code | Number of Items |
|----------------|-----------|-----------------|
| Cognitive      | Cog       | 1-8             |
| Affective      | Aff       | 1-10            |
| Pedagogy       | Ped       | 1-7             |
| Organizational | Org       | 1-8             |
| Legitimacy     | Leg       | 1-7             |
| Collaboration  | Col       | 1               |

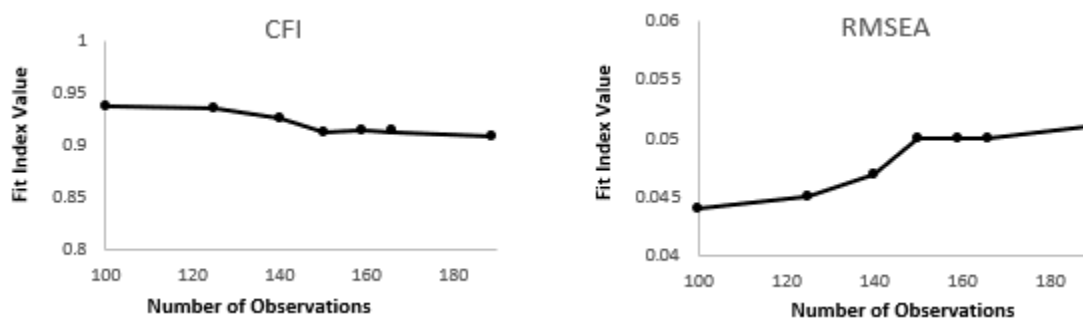
**Post hoc Power Analysis.** The final sample for the exploratory survey included 188 participants. The *plotRMSEApower* function in the *semTools* package in R (R Core Team, 2020) was employed to plot a power curve of RMSEAs over a range of sample sizes to verify the optimal sample size for analysis (Figure 4.7). The results indicated that to reach the recommended threshold of power = .8, 98 observations were required. With a sample size of 188, the observed power of the model was .98.

**Figure 4.7***Results of Post hoc Power Analysis*

In addition to verifying adequate power, to confirm model stability the survey results were downloaded as responses were collected and interim analyses were conducted at increasing intervals to compare the stability of the fit indices over a range of sample sizes. As seen in Figure 4.8, the model stabilized at approximately 150 participants.

**Figure 4.8**

*Graphs of Model Stability*



**Descriptive Statistics.** Summary statistics were evaluated using R Studio to examine the data structure and check for normality (Table 4.3). Normal distribution has an effect on the correlations in the analysis as it is one of the assumptions of the estimation method in SEM, the maximum likelihood of multivariate normality (Kline, 2016). Watkins (2018) discusses how non-normal distributions due to spread and linearity can produce artificial factors and can affect Pearson's correlation coefficients that are used for computing the EFA results. According to Hair (2017) data are considered to be normal if skewness and kurtosis are between -1 to +1. However, as SEM is a robust analytical method, a range as large as -10 and +10 is acceptable (Griffin & Steinbrecher, 2013). All data were within the recommended range with the exception of one item on the affect subscale (Aff2).

**Table 4.3***Descriptive Statistics for Exploratory Survey*

| <b>Item</b> | <b>Mean</b> | <b>SD</b> | <b>Skewedness</b> | <b>Kurtosis</b> |
|-------------|-------------|-----------|-------------------|-----------------|
| Cog1        | 5.79        | 1.24      | -1.34             | 1.78            |
| Aff1        | 6.37        | .86       | -1.26             | .71             |
| Cog2        | 5.82        | 1.08      | -1.2              | 2.14            |
| Aff2        | 6.66        | .68       | -2.9              | <b>12.85</b>    |
| Cog3        | 4.3         | 1.56      | -.19              | -1.02           |
| Aff3        | 5.56        | 1.26      | -.96              | .96             |
| Aff4        | 5.65        | 1.23      | -1.1              | 1.03            |
| Cog4        | 5.75        | 1.2       | -1.1              | .89             |
| Cog5        | 5.75        | 1.16      | -1.05             | .95             |
| Cog6        | 6.55        | .58       | -.85              | -.29            |
| Aff5        | 6.56        | .76       | -2.44             | 8.53            |
| Aff6        | 4.15        | 1.59      | -.22              | -.47            |
| Aff7        | 3.76        | 1.7       | -.03              | -1.19           |
| Aff8        | 5.06        | 1.66      | -.76              | -.39            |
| Aff9        | 6.3         | .95       | -1.85             | 4.51            |
| Cog7        | 3.48        | 1.6       | .18               | -.94            |
| Cog8        | 4.72        | 1.69      | -.57              | -.8             |
| Aff10_R     | 3.11        | 1.55      | .53               | -.77            |
| Ped1        | 4.13        | 1.7       | -.06              | -1.13           |
| Ped2        | 2.52        | 1.29      | .77               | .28             |
| Ped3        | 5.62        | 1.21      | -.96              | .31             |
| Org1        | 5.73        | 1.3       | -1.35             | 1.24            |
| Org2        | 4.36        | 1.73      | -.27              | -1.05           |
| Ped4        | 2.61        | 1.32      | .71               | -.16            |
| Ped5        | 6.32        | .76       | -1.12             | 1.22            |
| Org6        | 6.05        | 1.05      | -1.48             | 2.38            |
| Org7        | 5.58        | 1.51      | -1.36             | 1.39            |
| Ped7        | 5.72        | 1.16      | -.87              | .72             |
| Org8        | 4.72        | 1.41      | -.38              | -.78            |
| Leg1        | 5.52        | .98       | -.97              | 1               |
| Leg2        | 5.09        | 1.27      | -.53              | -.35            |
| Leg3        | 4.91        | 1.42      | -.57              | -.47            |
| Leg4        | 4.08        | 1.47      | -.18              | -.76            |
| Leg5        | 4.29        | 1.41      | -.26              | -.79            |
| Coll        | 5.16        | 1.4       | -.89              | .03             |
| Leg6        | 5.58        | .96       | -.86              | .74             |
| Leg7        | 5.25        | 1.17      | -.93              | .41             |

The Kaiser-Meyer-Olkin (KMO) measure was calculated to assess adequacy of the sample for factor analysis. This index indicates the proportion of variance among the variables related to the underlying factors (ibm.com/spss-statistics). Kaiser (1974) recommended a minimum of .5. The values of between .5-.7 are mediocre, between .7 and .8 are good, and above .8 are excellent (Hadi et al., 2016; Williams et al., 2010). The KMO results for the exploratory (pilot) survey were good (KMO = .71) which indicated that the sample data were adequate for factor analysis.

**Exploratory Factor Analysis.** Exploratory factor Analysis (EFA) is an important precursor to SEM/CFA. Due to its exploratory nature, it imposes fewer constraints than CFA and allows for freer estimation of potential associations and may reduce structural biases (Marsh et al., 2014; Watkins, 2018). Analysis of factor structure was conducted using both varimax and oblique rotations as well as with Pearson and polychoric correlations to assess which procedure produced the highest interpretability and parsimony. The factor loading cutoff limit was set to .4 to eliminate items that did not strongly correlate to the factor (Ford et al., 1986; Jones & Bartlett, 2015). A Pearson's correlation resulted in a solution of 12 factors with eigenvalues over 1. A parallel analysis was run concurrently which suggested seven factors. An analysis of polychoric correlations using the *Pol\_cor* function in R was assessed as well. The polychoric correlation suggested a five-factor solution. The identified seven-factor solution and the five-factor solution were explored and compared to assess which was a more appropriate model structure.

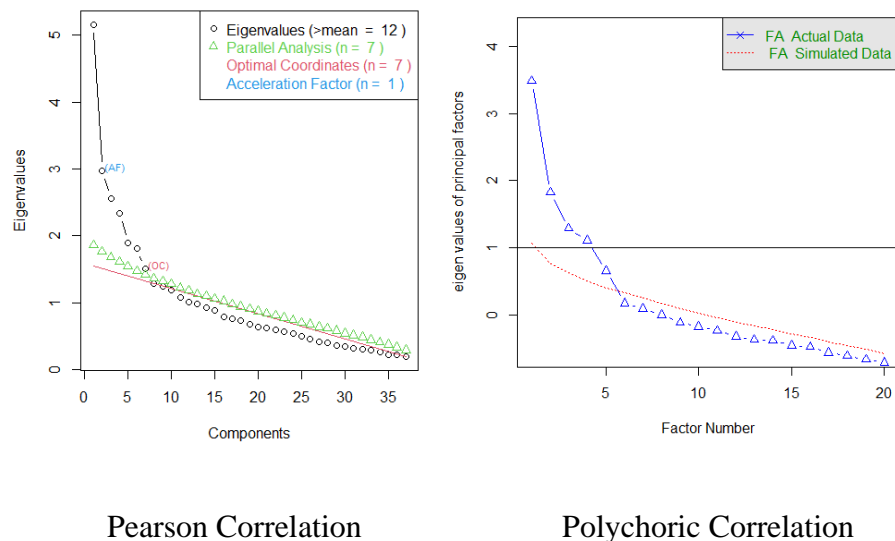
After assessing the factor loading, the five-factor solution was chosen as it demonstrated more theoretical sense as the items loaded on factors that conceptually corresponded to the underlying identity framework from which the model was founded. Three factors corresponded with core identity groups, two of which were analogous to Carlone and Johnson's identity groups

of (a) research scientist, (b) altruistic scientist, which were labeled as science identity, affective connection with nature. A third identity group described the construct of advocacy and was labeled as such. The three core identity factors correlate with Bronfenbrenner's concept of the microsystem which he postulated was the primary environment for the psychological development of how one orients to the world. Two additional factors clustered around the constructs of professional legitimacy and organizational position corresponding with Gee's (2000) notion of Discourse-identity (D-identity) and Institutional-identity (I-Identity).

Polychoric correlations have been suggested to be more appropriate for Likert scale items (Pendergast et al., 2017) and an examination of the scree plots from both the Pearson's and polychoric correlations (Figure 4.9) revealed that the eigenvalues beyond the fifth were approximately 1 and therefore did not contribute to the model. With these considerations, the five-factor solution was retained. Analysis of the five-factors revealed that the factors appeared to be independent and uncorrelated. Similarly, the results of the orthogonal (varimax) and oblique rotations yield identical results and each factor was independent, so the orthogonal rotation was retained.

**Figure 4.9**

*Scree Plots from EFA to Define Factor Structure*



**Retaining Items.** For item retention, the criterion for item factor loading (correlations between each item and each factor) is generally agreed upon to be .4 (Ford et al., 1986; Jones & Bartlett, 2015). Adhering to this convention, items with a factor loading of  $\geq .4$  were retained, with the exception of Aff10. *“I see myself as an environmental educator, not a science educator.”* This measure loaded at -.325, however it was found to increase model fit on the science identity factor, so it was reverse coded to obtain a positive value and included in the model. Retained items can be found in Table 4.4.

Factor one consisted of items corresponding to the legitimacy (Leg) subconstruct. Six of the seven items loaded strongly on this factor ranging from a loading of (.450-.748). Only the item Leg5, *“When I present programming to organizations such as schools or clubs, I have to navigate around many barriers to successfully accomplish my goals”* did not meet the threshold of .4 and was not retained. One item that expected to load on the organizational factor (Org),

loaded with the legitimacy items, Org8, *“My professional identity as an outdoor educator is valued by the general public (those not in an education field).”* This item was not retained as it decreased model fit.

Factor two contained items measuring affect (Aff). This factor loaded with six items (.427- .652) Four of which loaded as expected; however, two items, Ped5, *“The work of an outdoor educator is important for learners' growth and development”* and Cog. *“I frequently talk with my friends and family about ecological systems”* loaded unexpectedly on this factor. They had been hypothesized to measure pedagogy and cognitive subconstructs. Ped5, *“The work of an outdoor educator is important for learners' growth and development”* was retained as it was theoretically congruent to other items on the factor. Cog 5, *“I frequently talk with my friends and family about ecological systems”* was not retained as it cross loaded with factor four (science identity) and a strong theoretical case for retention could not be made.

Factor three consisted of three items all of which were associated with advocacy (Adv), which was originally hypothesized as being part of the affective and cognitive domains, but all items loaded strongly (.651-.772) on a single factor. Items included Aff4, *“Advocating for social justice is important to me.”*, Aff7, *“I participate in environmental advocacy activities such as demonstrations or marches.”*, and Cog7, *“I am often labeled as an activist.”*

Factor four consisted of four items measuring science identity (Cog) with loading ranging from (.416-.637). These items included Cog1, *“When I am in the outdoors, I often engage in or think about scientific processes.”* Cog3, *“I see myself primarily as a scientist.”* and Cog4, *“I identify with members of the teaching profession.”* and Cog5, *“I frequently talk with my friends and family about ecological systems.”* Cog5 was eliminated due its cross loading and ambiguous theoretical association.

Factor five consisted of four items measuring organizational positionality (Org) ranging from (.421-.859), three of which loaded as expected, Org7, "*I am encouraged to do as much professional development as I would like.*" Org6, "*I am respected by my supervisor for what I do.*" and Org1, "*In most situations, I have the power to make my own decisions about programming.*" One item loaded unexpectedly with the organizational items which had been conceptualized as pedagogy, Ped3, "*I feel that my educational philosophy matches the mission of the organization with which I work.*"

Overall, twenty-two of the forty-five initial content items (excluding demographic items) were retained, and the conceptual model was reorganized into a five-factor model. The cognitive and affective subconstructs were divided into three factors: science identity, affective connection with nature, and advocacy. The "pedagogy" subconstruct was eliminated as it did not contribute to the model nor to the theoretical framework of identity. Pedagogy is a related, but separate phenomenon from the intention of the model which is to explore OEs positional identity and what "kind of person" they are. The subconstruct of collaboration was not included in the analysis as this was a section of the survey that was answered by only a portion of respondents and therefore not representative of the full sample. Additionally, several respondents contacted me to tell me that their relationships were too dependent on context to be able to answer those items. The subconstructs of legitimacy and organization loaded highly on independent factors and were kept as originally hypothesized.

**Table 4.4***Factor Loading from Exploratory Factor Analysis*

| Item  | Factor 1<br>Legitimacy | Factor 2<br>Affect | Factor 3<br>Advocacy | Factor 4<br>Science ID | Factor 5<br>Organizational | Retained |
|---|------------------------|--------------------|----------------------|------------------------|----------------------------|----------|
| Cog1. When I am in the outdoors, I often engage in or think about scientific processes.                                   |                        |                    |                      | .637                   |                            | •        |
| Cog2 I am fascinated by humans' history with the natural world.   |                        |                    |                      |                        |                            |          |
| Cog3. I see myself primarily as a scientist.  |                        |                    |                      | .513                   |                            | •        |
| Cog4. I identify with members of the teaching profession.   |                        |                    |                      | .423                   |                            |          |
| Cog5. I frequently talk with my friends and family about ecological systems.  |                        | .47                |                      | .416                   |                            |          |
| Cog6. I think of myself as an educator.   |                        |                    |                      |                        |                            |          |
| Cog7. I am often labeled as an "activist."  |                        |                    | .772                 |                        |                            | •        |
| Cog8. I feel that people expect me to be an expert on ALL science topics (e.g., biodiversity and physical earth systems). |                        |                    |                      |                        |                            |          |
| Aff1. I feel the most comfortable when I am outside connecting with the natural world.                                    |                        | .652               |                      |                        |                            | •        |
| Aff2. Being in the outdoors is powerful because it inspires a sense of awe and wonder.                                    |                        | .512               |                      |                        |                            | •        |
| Aff3. I see myself primarily as an environmental advocate.  |                        |                    |                      |                        |                            |          |

**Table 4.4***(continued)*

| Item   | Factor 1<br>Legitimacy | Factor 2<br>Affect | Factor 3<br>Advocacy | Factor 4<br>Science ID | Factor 5<br>Organizational | Retained |
|--|------------------------|--------------------|----------------------|------------------------|----------------------------|----------|
| Aff4. Advocating for social justice is important to me.  |                        |                    | .651                 |                        |                            | •        |
| Aff5. I feel a strong emotional connection with the natural world.   |                        | .636               |                      |                        |                            | •        |
| Aff6. The most exciting part of participating in "extreme" outdoor adventure activities (e.g., bungee jumping, flyboarding, caving) is the adrenaline rush and the degree of risk. |                        |                    |                      |                        |                            |          |
| Aff7. I participate in environmental advocacy activities such as demonstrations or marches.  |                        |                    | .699                 |                        |                            | •        |
| Aff8. I would classify myself as a caregiver.  |                        |                    |                      |                        |                            |          |
| Aff9. Other people see me as a "nature person."  |                        | .567               |                      |                        |                            | •        |
| Aff10. I see myself as an environmental educator, not a science educator.  |                        |                    |                      | -.325                  |                            | •        |
| Ped1. The central focus of my programming is to support school-based science.  |                        |                    |                      |                        |                            |          |
| Ped2. I would rather participants leave my programs with specific scientific knowledge than with positive feelings about the environment.  |                        |                    |                      | .358                   |                            | •        |

**Table 4.4***(continued)*

| Item   | Factor 1<br>Legitimacy | Factor 2<br>Affect | Factor 3<br>Advocacy | Factor 4<br>Science ID | Factor 5<br>Organizational | Retained |
|--|------------------------|--------------------|----------------------|------------------------|----------------------------|----------|
| Ped3. I feel that my educational philosophy matches the mission of the organization with which I work.                   |                        |                    |                      |                        | .507                       | •        |
| Ped4. I prefer to deliver information rather than have participants in my programs discover it on their own.             |                        |                    |                      |                        |                            |          |
| Ped5. The work of an outdoor educator is important for learners' growth and development.                                 |                        | .427               |                      |                        |                            | •        |
| Ped6. Being an outdoor educator is my professional calling.  |                        |                    |                      |                        |                            |          |
| Org1. In most situations, I have the power to make my own decisions about programming.                                   |                        |                    |                      |                        | .421                       | •        |
| Org2. I am encouraged to advocate for my beliefs and values in my professional role as an outdoor educator.              |                        |                    |                      |                        |                            |          |
| Org6. I am respected by my supervisor for what I do.   |                        |                    |                      |                        | .859                       | •        |
| Org7. I am encouraged to do as much professional development as I would like.  |                        |                    |                      |                        | .610                       | •        |
| Org8. My professional identity as an outdoor educator is valued by the general public (those not in an education field). | .424                   |                    |                      |                        |                            |          |

**Table 4.4***(continued)*

| Item   | Factor 1<br>Legitimacy | Factor 2<br>Affect | Factor 3<br>Advocacy | Factor 4<br>Science ID | Factor 5<br>Organizational | Retained |
|--|------------------------|--------------------|----------------------|------------------------|----------------------------|----------|
| Leg1. Educators not in the outdoor education field see value in the programs that I lead.  | .748                   |                    |                      |                        |                            | •        |
| Leg2. Formal educators look up to me (in my role as an outdoor educator) as a source of knowledge.   | .572                   |                    |                      |                        |                            | •        |
| Leg3. Educators outside my profession see the outdoors as a legitimate learning space.   | .671                   |                    |                      |                        |                            | •        |
| Leg4. My profession is recognized as being part of the education profession by the general public.   | .630                   |                    |                      |                        |                            | •        |
| Leg5. When I present programming to organizations such as schools or clubs, I have to navigate around many barriers to successfully accomplish my goals. |                        |                    |                      |                        |                            |          |
| Leg6. I share similar learning and teaching goals with the organizations and groups with which I work.   | .450                   |                    |                      |                        |                            | •        |
| Leg7. Formal educators respect me as a professional (in my role as an outdoor educator).   | .670                   |                    |                      |                        |                            | •        |
| Col1. I feel that I am part of the professional education community.   |                        |                    |                      |                        |                            |          |

**Confirmatory Factor Analysis.** CFA follows EFA and is used to confirm the validity of a hypothesized model structure by comparing a hypothesized model with a baseline or “null” model in which none of the variables are correlated (Knekta et al., 2019; Worthington & Whittaker, 2006). The CFA in R uses maximum likelihood estimation to test factor structure. CFA was conducted on the five-factor model that was identified in the EFA. Each model factor corresponded with a construct that is conceptually congruent with the foundational identity theories of Gee’s (2000) socially recognized identity and Bronfenbrenner’s (1977) personal (core) identity on which the survey items were based. These factors included the three personal identity factors of (a) science identity, (b) affective connection with nature, and (c) advocacy, and the social factors of recognition (d) professional legitimacy and (e) organizational position.

**Model Fit.** Goodness of fit indices are common metrics used by researchers to compare a hypothesized model to a baseline independent model to assess and quantify how well the proposed hypothetical model fits the data (Hinkin, 1998; Knekta et al., 2019; Worthington & Whittaker, 2006). Each of these indices was used to assess model fit for the hypothesized model.

The five-factor model that resulted from the EFA was assessed first and revealed  $\chi^2 = 247$ ,  $P < .001$ , CFI = .85, TLI = .825 RMSEA = .066, SRMR = .071. The modification indices and factor loadings were examined to improve fit. Modification indices are computed for the measurement or structural model where a parameter had not been estimated and predicts the potential change in  $\chi^2$  if that parameter were to be estimated (Iacobucci, 2009). An examination of the modification indices did not indicate that any modification would result in a significant change to  $\chi^2$  or model fit. However, Cog 4, “*I identify with members of the teaching profession*” was removed from the science factor as it did not load highly and was conceptually incongruent. After removing this item the science identity factor was left with only two items, which is not

recommended as it has a negative effect on internal consistency. Hinkin, (1998) recommends at least three items per factor for reliability. *Aff10*, “*I see myself as an environmental educator, not a science educator*” was added and reverse coded as it had a negative loading (-.325) in the EFA but was associated with the science identity factor. This modification improved the model fit slightly, CFI = .877, TLI = .857, RMSEA = .057, SRMR = .070. Next, *Org 8*. “*My professional identity as an outdoor educator is valued by the general public (those not in an education field)*” and *Leg6*. “*I share similar learning and teaching goals with the organizations and groups with which I work.*” were removed from the legitimacy factor as they had low factor loadings (.424 and .450 respectively). The results of this third model resulted in a model with all index values within the range of “acceptable to good” (Hu & Bentler, 1999).  $\chi^2 = 247$ ,  $P < 0.001$ , CFI = .910, TLI .894 RMSEA = .051, SRMR = .059. Several other modifications were assessed with none leading to significant change in model fit.

Finally, as the hypothesized model was intended to be hierarchal, a higher order factor was created for the three personal identity factors (science identity, affective connection with nature, advocacy). Legitimacy and organizational were left as independent factors as each represented a separate conceptual construct. The hierarchal model did not change model fit significantly and maintained a “good” fit (Table 4.5),  $\chi^2 = 240$ , CFI = .911, TLI .897, RMSEA = .05, SRMR = .06.

**Table 4.5***Fit Statistics for Exploratory Survey*

| <b>Fit Statistic</b>                             | <b>Value</b> |
|--|--------------|
| <b>Likelihood ratio</b>                          |              |
| Chi <sup>2</sup> ms                              | 240.173      |
| p > chi <sup>2</sup>                             | .000         |
| Chi <sup>2</sup> bs                              | 1050.096     |
| p > chi <sup>2</sup>                             | .000         |
| <b>Baseline Comparison</b>                       |              |
| Comparative Fit Index (CFI)                      | .911         |
| Tucker-Lewis Index (TLI)                         | .897         |
| <b>Information Criteria</b>                      |              |
| Akaike (AIC)                                     | 10977.794    |
| Bayesian (BIC)                                   | 11126.425    |
| <b>Population error</b>                          |              |
| Root mean square of approximation (RMSEA)        | .050         |
| 90% CI, lower bound                              | .036         |
| Upper bound                                      | .063         |
| <b>Standard Root Mean Square Residual (SRMR)</b> | .061         |

The final measurement model consisted of 20 items on five latent variables. Science identity contained three measured variables. Advocacy also contained three measured variables. There were five measures for affective connection, four measures for organizational and five measures for legitimacy (Table 4.4).

***Internal Consistency and Reliability.*** Internal consistency and reliability analysis was conducted on each of the factors using Cronbach's Alpha. Alpha of .6-.7 is acceptable, .7- .8 good , .8-.9 very good, and > .9 is considered excellent (Hinkin, 1998; Kline, 2016; Taber, 2018). Overall alpha for the model was .74. The alpha for each subcontract can be seen in (Table 4.6) below.

**Table 4.6***Subscale Alpha Values for Exploratory Survey*

| <b>Item</b>  | <b>Subscale alpha 1</b> |
|--------------|-------------------------|
| Science      | .52                     |
| Affect       | .72                     |
| Advocacy     | .77                     |
| Organization | .70                     |
| Legitimacy   | .80                     |

**Confirmatory Survey**

DeVellis (2017) suggests that to ensure reliability of a scale it must be replicated using an independent sample to ensure that the results are stable and not a one-time chance occurrence or is context dependent. A second distribution of the survey was administered to a national pool of OEs to confirm the results of the initial exploratory (pilot) survey analysis, to validate both temporal and contextual reliability, and to allow for the opportunity to modify the scale if needed to strengthen and optimize it.

The initial survey revealed that science identity subconstruct demonstrated weak reliability ( $\alpha = .52$ ). To strengthen this measure, this subscale was replaced in the confirmatory survey with three items adapted from an existing science identity scale (Cole, 2012) to improve reliability. These items included, *“I feel a strong attachment to scientific fields.”*, *“I spend my free time trying to find out more about science and science topics.”* and, *“The logic and methods used in scientific fields are exciting to me.”* Two of the previous science items were retained to serve as indicators of convergent validity and ensure that the new items correlated with the latent construct of science identity and loaded on the corresponding factor. The two science identity items that were retained were, *“When I am in the outdoors, I often engage in or think about*

*scientific processes.*” and “*I see myself primarily as a scientist.*” See Appendix I for revised survey items.

### ***Sample Size***

The post hoc power analysis conducted in the exploratory model suggested that a sample size as low as 98 would be large enough to reach sufficient power (power = .8) (stats.idre.ucla.edu). However, as SEM is particularly sensitive to sample size, to ensure congruency between the exploratory (pilot) survey and the confirmatory survey, and to ensure stability, both surveys included approximately equal numbers (exploratory (pilot) survey, N = 188, confirmatory survey, N = 209).

### ***Descriptive Statistics***

The mean, standard deviation, skewedness and kurtosis were examined using R Studio to summarize the data and check for normality (Kline, 2016; Watkins 2018). Table 4.7 displays summary statistics to assess data structure.

**Table 4.7**

#### *Descriptive Statistics for Confirmatory Survey*

| <b>Item</b> | <b>Mean</b> | <b>SD</b> | <b>Skewedness</b> | <b>Kurtosis</b> |
|-------------|-------------|-----------|-------------------|-----------------|
| Sci1        | 5.84        | 1.17      | -1.33             | 2.14            |
| Sci3        | 5.35        | 1.09      | -.64              | .46             |
| Sci2        | 5.44        | 1.13      | -1.08             | 1.75            |
| Aff1        | 6.42        | .81       | -2.29             | 9.67            |
| Aff2        | 6.71        | .52       | -1.52             | 1.38            |
| Aff3        | 6.42        | .91       | -2.59             | 9.22            |
| Aff4        | 6.64        | .55       | -1.16             | .34             |
| Adv1        | 6.06        | 1.15      | -1.96             | 5.2             |
| Adv2        | 4.17        | 1.73      | -.18              | -.95            |
| Adv3        | 3.56        | 1.71      | .1                | -1.14           |
| Org1        | 5.79        | 1.39      | -1.28             | .96             |
| Org2        | 5.78        | 1.33      | -1.31             | 1.13            |

**Table 4.7***(continued)*

| <b>Item</b> | <b>Mean</b> | <b>SD</b> | <b>Skewedness</b> | <b>Kurtosis</b> |
|-------------|-------------|-----------|-------------------|-----------------|
| Org3        | 5.96        | 1.32      | -1.82             | 3.22            |
| Org4        | 5.25        | 1.62      | -.91              | .02             |
| Leg1        | 5.67        | 1.16      | -1.24             | 1.81            |
| Leg2        | 5.49        | 1.2       | -1.01             | 1.06            |
| Leg3        | 4.94        | 1.29      | -.64              | -.19            |
| Leg4        | 4.16        | 1.51      | -.14              | -.96            |
| Leg5        | 5.25        | 1.3       | -.68              | -.34            |
| Aff5        | 6.68        | .71       | -3.8              | <b>22.07</b>    |
| Cog3        | 4.49        | 1.49      | -.42              | -.56            |
| Cog1        | 5.85        | 1.21      | -1.71             | 3.55            |
| Ped3        | 2.74        | 1.26      | .55               | -.01            |
| Aff11       | 5.2         | 1.6       | -.7               | -.39            |

*Note.* Highlighted values are out of acceptable range of a normal distribution for SEM

The Kaiser-Meyer-Olkin (KMO) measure was calculated to assess adequacy of the sample for factor analysis. For the confirmatory survey, the KMO improved from .71 in the exploratory survey to KMO = .73 in the confirmatory survey.

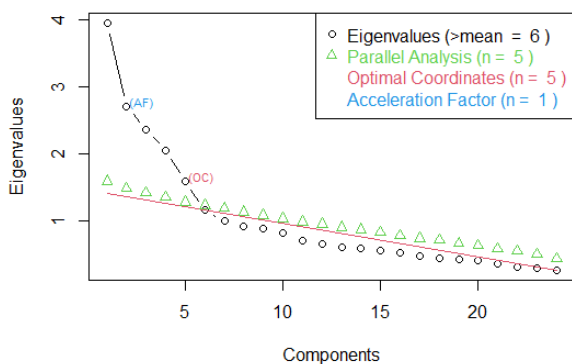
### ***Exploratory Factor Analysis***

The new data from the confirmatory survey were analyzed using the coding developed in R for the exploratory (pilot) survey, replacing only the name of the data frame to point to the confirmatory survey dataset. Replicating the procedures developed in the exploratory (pilot) survey analysis with an independent sample assessed the reliability and stability of the model. The science identity factor was evaluated to test convergent validity, assess how closely the new scale was correlated with the retained science identity items from the exploratory (pilot) survey, and to verify that all items were measuring the same construct (Krabbe, 2017). All the science identity items loaded on the same factor. All the remaining items loaded on the same factors and

displayed the same factor loading pattern as in the exploratory (pilot) survey. The EFA revealed a five-factor solution as can be seen in the screen plot in Figure 4.10. Only the Pearson's correlation was retained as comparison of Pearson's and polychoric correlations resulted in similar eigenvalue and factor structures. Additionally, Pearson's is the method that R uses to calculate its correlational measurement indices in CFA.

**Figure 4.10**

*Scree Plot for Confirmatory Survey*



Once the factor structure was assessed, the item labels that had been retained from the exploratory survey were renamed to reflect the construct for which they measured and for ease of interpretation. The science identity items were labeled “Sci”, affective connections with nature were labeled “Aff” and items related to advocacy were labeled “Adv”. The labels “Leg” for the professional legitimacy and “Org” for organizational position were retained from the exploratory (pilot) survey. The factor loading from the EFA can be seen in Table 4.8.

**Table 4.8***Factor Loading for Confirmatory Survey*

| Item  | Factor 1<br>Legitimacy | Factor 2<br>Affect | Factor 3<br>Advocacy | Factor 4<br>Science ID | Factor 5<br>Organizational |
|---|------------------------|--------------------|----------------------|------------------------|----------------------------|
| Cog 1. When I am in the outdoors, I often engage in or think about scientific processes.    |                        |                    |                      | .371                   |                            |
| Cog 3. I see myself primarily as a scientist.   |                        |                    |                      | .514                   |                            |
| Sci1. I feel a strong attachment to scientific fields.                                      |                        |                    |                      | .653                   |                            |
| Sci2. I spend my free time trying to find out more about science and science topics.        |                        |                    |                      | .522                   |                            |
| Sci3. The logic and methods used in scientific fields are exciting to me.                   |                        |                    |                      | .501                   |                            |
| Adv1. Advocating for social justice is important to me.                                     |                        |                    | .614                 |                        |                            |
| Adv2. I participate in environmental advocacy activities such as demonstrations or marches. |                        |                    | .790                 |                        |                            |
| Adv3. I am often labeled as an "activist."  |                        |                    | .772                 |                        |                            |
| Aff1. I feel the most comfortable when I am outside connecting with the natural world.      |                        | .587               |                      |                        |                            |
| Aff2. I feel a strong emotional connection with the natural world.                          |                        | .572               |                      |                        |                            |
| Aff3. Other people see me as a "nature person."   |                        | .564               |                      |                        |                            |
| Aff4. The work of an outdoor educator is important for learners' growth and development.    |                        | .343               |                      |                        |                            |

**Table 4.8***(continued)*

| Item   | Factor 1<br>Legitimacy | Factor 2<br>Affect | Factor 3<br>Advocacy | Factor 4<br>Science ID | Factor 5<br>Organizational |
|--|------------------------|--------------------|----------------------|------------------------|----------------------------|
| Aff5. Being in the outdoors is powerful because it inspires a sense of awe and wonder.                 |                        | .599               |                      |                        |                            |
| Org1. I feel that my educational philosophy matches the mission of the organization with which I work. |                        |                    |                      |                        | .658                       |
| Org2. In most situations, I have the power to make my own decisions about programming.                 |                        |                    |                      |                        | .614                       |
| Org3. I am respected by my supervisor for what I do.   |                        |                    |                      |                        | .794                       |
| Org4. I am encouraged to do as much professional development as I would like.                          |                        |                    |                      |                        | .574                       |
| Leg1. Educators not in the outdoor education field see value in the programs that I lead.              | .716                   |                    |                      |                        |                            |
| Leg2. Formal educators look up to me (in my role as an outdoor educator) as a source of knowledge.     | .661                   |                    |                      |                        |                            |
| Leg3. Educators outside my profession see the outdoors as a legitimate learning space.                 | .623                   |                    |                      |                        |                            |
| Leg4. My profession is recognized as being part of the education profession by the general public.     | .540                   |                    |                      |                        |                            |
| Leg5. Formal educators respect me as a professional (in my role as an outdoor educator).               | .672                   |                    |                      |                        |                            |

The results of the EFA revealed that the data were correlated with the five constructs relating to OEs' identity. Factor 1 included the OEs' perception of their professional legitimacy within the educational ecosystem, Factors 2 to 4 included the OEs' personal identity which constituted their affective connections to the outdoors, their perception of themselves as

advocates, and their science identity. Factor 5 included the construct of their organization identity.

### ***Confirmatory Factor Analysis***

The CFA was conducted after the EFA to confirm the validity of the model structure as hypothesized and to test the relationships between the item measures and the five latent identity constructs. Most importantly, performing the CFA on the independent confirmatory survey with the same restraints placed on the exploratory (pilot) survey confirms the reliability of the model structure. The results of the CFA are used to confirm that the OEPIS instrument is a valid and reliable measure of OE positional identity.

**Fit Statistics.** The model using the suggested measures from EFA resulted in slightly lower incremental fit indices than the initial model of the exploratory (pilot) survey,  $\chi^2 = 341$ , CFI = .852, TLI 0.827, RMSEA = .066, SRMR = .071. However, the absolute fit indices (RMSEA and SRMR) were comparable and showed little change between the exploratory survey and the confirmatory survey.

Cog 3, “*I see myself primarily as a scientist*” was removed as although it loaded well,  $>.4$  on the science factor, it did not contribute to the model fit. Additionally, the definition of *scientist* is laden with conceptual and cultural assumptions which makes interpretation ambiguous (Carlone & Johnson, 2007; Cole, 2012). Cog1, “*When I am in the outdoors, I often engage in or think about scientific processes*” loaded below the threshold of .4 (.371) and was therefore removed. Aff4, “*The work of an outdoor educator is important for learners' growth and development*” (.343) was included on the affect factor despite low factor loading as it is conceptually significant, was present in the exploratory (pilot) survey, and improved model fit. Aff5, “*Being in the outdoors is powerful because it inspires a sense of awe and wonder*” was

removed as it showed no variance in item response and the descriptive statistics revealed a kurtosis of 22.7, proving it not to be a useful measurement indicator.

Replacing the science subconstruct with the new measures adapted from the science identity scale and leaving all other measure consistent with the exploratory survey model, the resulting fit statistics indicated very similar results from the exploratory (pilot) survey (Table 4.9); the non-hierarchical model resulted in  $\chi^2 = 225$ , CFI = .914, TLI = .897 RMSEA = .053, SRMR = .062. The hierarchical model resulted in  $\chi^2 = 237$ , CFI = .906, TLI = .890 RMSEA = .055, SRMR = .068. The nearly identical results between the two independent surveys indicate that the model, even when distributed to populations that differed geographically, is highly stable and both temporally and contextually reliable.

**Table 4.9**

*Fit Statistics for Confirmatory Survey*

| Fit Statistic                                    | Value     |
|--|-----------|
| <b>Likelihood ratio</b>                          |           |
| Chi <sup>2</sup> ms                              | 237.747   |
| p > chi <sup>2</sup>                             | .000      |
| Chi <sup>2</sup> bs                              | 1151.598  |
| p > chi <sup>2</sup>                             | .000      |
| <b>Baseline Comparison</b>                       |           |
| Comparative Fit Index (CFI)                      | .906      |
| Tucker-Lewis Index (TLI)                         | .890      |
| <b>Information Criteria</b>                      |           |
| Akaike (AIC)                                     | 11543.843 |
| Bayesian (BIC)                                   | 11690.906 |
| <b>Population error</b>                          |           |
| Root mean square of approximation (RMSEA)        | .055      |
| 90% CI, lower bound                              | .042      |
| Upper bound                                      | .067      |
| <b>Standard Root Mean Square Residual (SRMR)</b> | .068      |

**Demographic Measures.** The demographic measures were not included in the final model because when they were added to the SEM as variables, they resulted in a decrease in model fit and did not show any significant predictive value or correlation among the items measuring OE identity. They did serve to describe the population being measured and therefore were conceptually important to understand the structure of the sample population but were not statistically predictive in the model. Only a few demographic items were marginally significant on individual items at the .05 level and a few at the .01 level (Table 4.10). None showed any strong predictive value for any of the constructs. Gender identity indicated the strongest correlations; however, the sample size ( $n \leq 5$ ) for the non-binary and other categories were too small to draw any valid conclusions.

**Table 4.10**

*Correlations of Demographic Data with Survey Items*

| Item | Age           | Gender         | Region | Education      | Race  | Experience    |
|------|---------------|----------------|--------|----------------|-------|---------------|
| Sci1 | .158*         | -.046          | -.01   | .119           | -.036 | .055          |
| Sci3 | <b>.192**</b> | .004           | -.005  | .143*          | -.064 | .163*         |
| Sci2 | .167*         | .059           | -.1    | .13            | .073  | .007          |
| Aff1 | .097          | -.062          | -.084  | .132           | -.004 | .071          |
| Aff2 | .128          | -.164*         | -.116  | .104           | .064  | .103          |
| Aff3 | .014          | -.095          | -.168* | .064           | .101  | .138*         |
| Aff4 | .023          | <b>-.202**</b> | .101   | .053           | -.04  | .001          |
| Adv1 | -.014         | -.016          | .073   | .101           | -.048 | -.025         |
| Adv2 | -.037         | .096           | .008   | .134           | .072  | -.028         |
| Adv3 | -.132         | .000           | -.006  | .011           | .134  | -.043         |
| Org1 | -.009         | -.1            | -.051  | -.045          | .028  | .02           |
| Org2 | -.018         | <b>-.195**</b> | -.083  | -.011          | .064  | <b>.196**</b> |
| Org3 | .105          | <b>-.191**</b> | .046   | .054           | .052  | .099          |
| Org4 | .055          | -.098          | -.068  | -.017          | .102  | .025          |
| Leg1 | .058          | -.037          | -.028  | -.014          | -.034 | -.033         |
| Leg2 | .172*         | -.029          | -.007  | -.048          | -.006 | .157*         |
| Leg3 | .009          | .003           | -.01   | <b>-.203**</b> | .004  | -.113         |
| Leg4 | .029          | .126           | -.101  | -.088          | .082  | -.029         |
| Leg5 | .134          | -.078          | -.101  | .056           | .125  | .103          |

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

**Internal Consistency and Reliability.** Internal consistency and reliability analysis was conducted on each of the factors using Cronbach's Alpha (Table 4.11). Alpha of .6-.7 is acceptable, .7-.8 is good, .8-.9 is very good, and  $> .9$  is considered excellent (Hinkin, 1998; Kline, 2016; Taber, 2018). The reliability of the science identity subscale was greatly improved with the new science items. Overall alpha for the confirmatory survey ( $\alpha = .75$ ), very similar to the alpha ( $\alpha = .74$ ) that was achieved in the exploratory survey.

**Table 4.11**

*Comparison of Alpha Values of Exploratory and Confirmatory Survey Subscales*

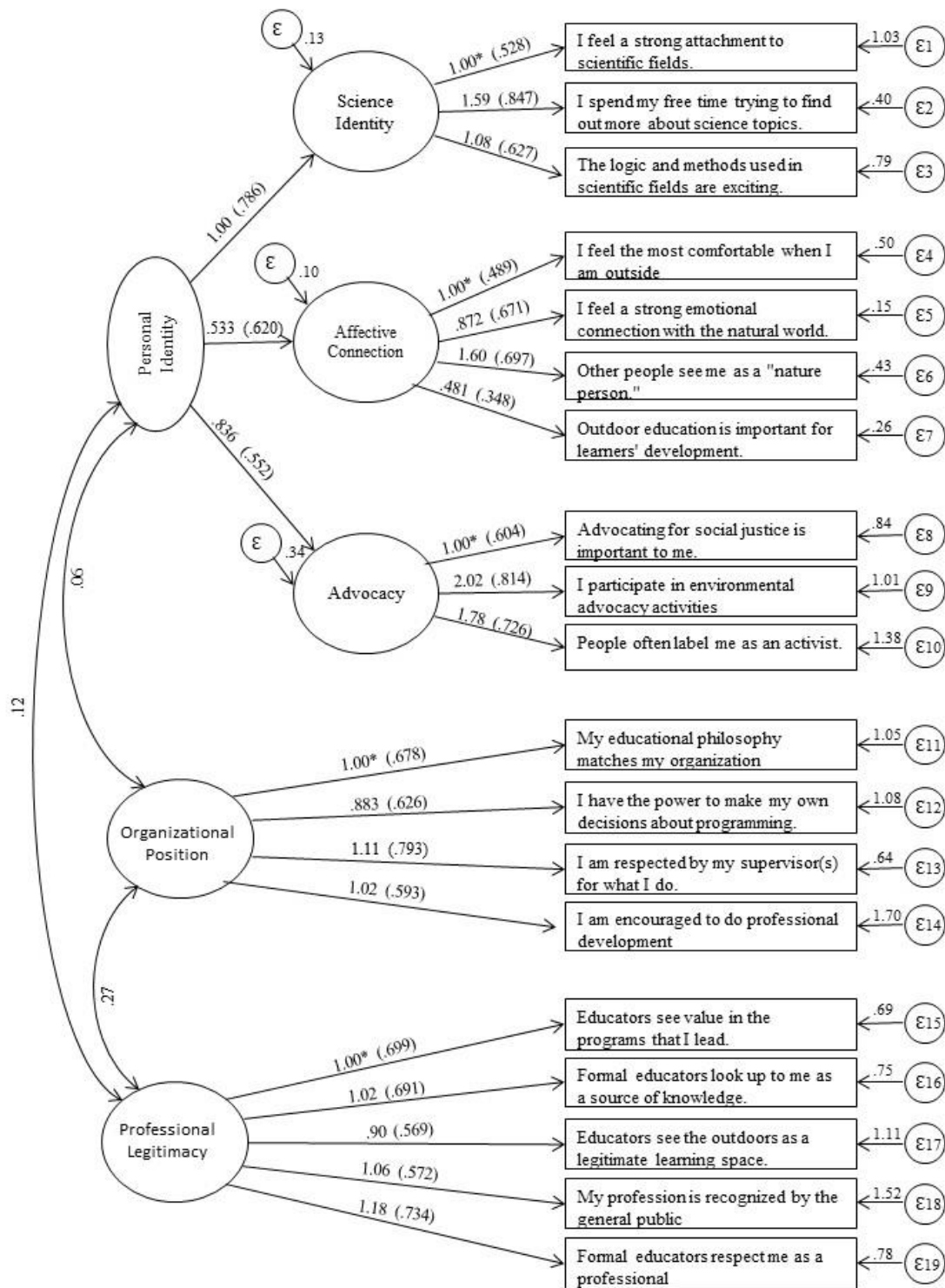
| Item         | Subscale alpha<br>(exploratory survey) | Subscale alpha<br>(confirmatory survey) |
|--------------|--|---|
| Science      | .52                                    | .68                                     |
| Affect       | .72                                    | .62                                     |
| Advocacy     | .77                                    | .75                                     |
| Organization | .70                                    | .77                                     |
| Legitimacy   | .80                                    | .73                                     |

### *Final Model*

The final model resulting from the SEM of the confirmatory survey is illustrated in Figure 4.11. The regression coefficients can be seen on the arrows leading from the latent variable to the measurement variable, the factor loadings are in parentheses. The error terms (variance not explained by the model) are denoted by the  $\epsilon$  term and the curved lines with double arrows indicate covariance among variables. The coefficients are standardized to fix the first measure to "1" and each subsequent measure is relative to the first.

**Figure 4.11**

*Final SEM Model*



## Summary of Chapter

The initial scale development for the model focused primarily on the psychometrics of the item construction, e.g., the content, wording, and order of individual items and determining how the items statistically correlated and coalesced into measurable constructs. The EFA was an instrumental step in clarifying the latent constructs that were underlying the measures as hypothesized. The resulting personal identity constructs reflected Bronfenbrenner's (1977) ecological theory of core development and Gee's (2000) idea of the socially recognized identity and "kind of person" one is. The personal identity constructs were distilled into distinct factors of science identity, affective connection with nature, and advocate. The factors of organizational position and professional legitimacy adhered to Gee's (2000) idea of social recognition as a component of socially situated identity. The demographic variables were not significant predictors, nor did they contribute to the model indicating that OE identity is not predicated on demographics and are more strongly measured by psycho-social factors such as personal development as postulated by Bronfenbrenner's (1977) ecological systems theory of development and social recognition of the profession as posited by Gee (2000).

The model fit indices indicate that the final model is a valid and reliable measure to investigate the phenomenon of OE identity in the educational ecosystem. As personal identity development of OEs had not been investigated, this phase achieved its intended objective to explore the dimensions of OE identity with the intention of using these findings as a knowledge base for further refinement and focused study on OE identity.

## CHAPTER 5

### RESULTS

The results of this mixed methods study will be presented in three parts in accordance with the analytical process. First, the quantitative data gleaned from the validated survey will be discussed, followed by the qualitative data from the phenomenological analysis of the interviews to provide contextual meaning and relevance to the quantitative findings. Finally, the data integration of the quantitative and qualitative data will be presented to illustrate the coherence and meta-inferences derived from both datasets analyzed in the study.

#### **Quantitative Findings**

The results of the validated model were analyzed to summarize and describe the central tendency and the variability of the level of agreement for which the OEs responded to each measure of the positional identity scale (OEPIS). To calculate the magnitude of differences between groups to ensure that the reported differences had substantive significance in addition to statistical significance, Cohen's  $d$  was calculated to determine the effect size (Sullivan & Feinn, 2012). All data will be organized and presented by the five identity constructs that were identified in the factor analysis during survey development. First, the demographic data will be presented to provide a context of the sample population. Then, the core identity constructs of science identity, affective connection with nature, and advocacy situated under the construct of personal identity will be presented. Next will be organizational position, and finally professional legitimacy. Each will be presented with the associated research questions.

#### ***Demographics***

To understand the characteristics of both the exploratory and confirmatory surveys each demographic item was summarized by frequency and calculated as a percentage of each

population as seen in Table 5.1. Both the exploratory (pilot) NC survey and the confirmatory nationally distributed survey resulted in very similar demographic profiles.

**Table 5.1**

*Demographic Data from Survey*

| <b>Demographics</b>    | <b>Number of Respondents Exploratory Survey</b> | <b>Percentage of Respondents Exploratory Survey</b> | <b>Number of Respondents Confirmatory Survey</b> | <b>Percentage of Respondents Confirmatory Survey</b> |
|------------------------|---|---|--|--|
| <b>Age</b>             |   |   |  |  |
| 18-25                  | 17  | 9.4%  | 14   | 6.6%   |
| 26-35                  | 67  | 36.02%  | 63   | 29.9%  |
| 36-45                  | 46  | 24.46   | 61   | 28.9%  |
| 46-55                  | 26  | 13.89%  | 40   | 19.0%  |
| >55                    | 30  | 16.13%  | 33   | 15.6%  |
| <b>Gender</b>          |   |   |  |  |
| Female                 | 152   | 81.72%  | 164  | 77.7%  |
| Male                   | 27  | 14.52%  | 41   | 19.4%  |
| Non-binary             | 2   | 1.08%   | 4  | 1.9%   |
| Other                  | 1   | .54%  | 1  | .5%  |
| Prefer not to say      | 4   | 2.15%   | 1  | .5%  |
| <b>Race/Ethnicity</b>  |   |   |  |  |
| Asian/Pacific Islander | 0   | 0%  | 2  | .95%   |
| Black/African American | 1   | .54%  | 1  | .47%   |
| Latin American         | 4   | 2.1%  | 7  | 3.32%  |
| Native American        | 1   | .54%  | 1  | .47%   |
| White                  | 172   | 92.47%  | 181  | 85.8%  |
| Multiple               | 4   | 2.15%   | 13   | 6.16%  |
| Other                  | 4   | 2.15%   | 6  | 2.84%  |
| <b>Education</b>       |   |   |  |  |
| High school            | 2   | 1.08%   | 0  | 0%   |
| 2-year college         | 7   | 3.76%   | 6  | 2.84%  |
| 4-year college         | 87  | 46.77%  | 79   | 37.44%   |

**Table 5.1***(continued)*

| <b>Demographics</b>         | <b>Number of Respondents Exploratory Survey</b> | <b>Percentage of Respondents Exploratory Survey</b> | <b>Number of Respondents Confirmatory Survey</b> | <b>Percentage of Respondents Confirmatory Survey</b> |
|-----------------------------|---|---|--|--|
| Graduate degree             | 87  | 46.77%  | 122  | 57.82%   |
| Non-degree certification    | 3   | 1.61%   | 4  | 1.90%  |
| <b>Experience</b>           |   |   |  |  |
| 0-2                         | 21  | 11.29%  | 8  | 3.39%  |
| 3-5                         | 39  | 20.97%  | 40   | 18.96%   |
| 6-10                        | 48  | 25.81%  | 48   | 22.75%   |
| >10                         | 78  | 41.94%  | 115  | 54.5%  |
| <b>Region</b>               |   |   |  |  |
|                             | NA  | NA  |  |  |
| Northeast                   |   |   | 31   | 14.7%  |
| Southeast                   |   |   | 69   | 32.7%  |
| Midwest                     |   |   | 38   | 18.0%  |
| West                        |   |   | 51   | 24.17%   |
| Southwest                   |   |   | 20   | 9.48%  |
| Outside contiguous states   |   |   | 2  | .95%   |
| <b>Type of Organization</b> |   |   |  |  |
| NGO                         | 1   | .54%  | 7  | 3.3%   |
| Nonprofit                   | 65  | 34.95%  | 81   | 38.3%  |
| For profit                  | 6   | 3.23%   | 5  | 2.4%   |
| Government                  | 80  | 46.01%  | 96   | 45.5%  |
| School                      | 17  | 9.14%   | 13   | 6.3%   |
| University                  | 17  | 9.14%   | 9  | 4.7%   |

The majority of respondents (60%) were between the ages of 26 and 45, identified as female, (81.72%, 77.7% for exploratory and confirmatory surveys, respectively), White (92.47%, 85.8%), and in both sample populations, >90% of respondents hold a four-year college or graduate degree, over 75% of respondents have been working as OEs for six years or more. Over

85% of the OEs in both sample populations work for nonprofit or government organizations. Despite efforts to include OEs of color, the sample pools were majority White cis-gender females, which is consistent with the demographic representation in the OE profession (Gress & Hall, 2017; Taylor, 2015).

Due to this lack of variation in the population, mean comparisons of identity measures among the demographic variables did not result in significant or reliable findings. The only latent variable that indicated any statistically significant differences among demographic groups were within the science identity subscale. Older OEs (>55 years old) agreed more strongly ( $M = 6.0$ ,  $SD = 1.1$ ) with the science identity items than those in the youngest age category (18-25 years old) ( $M = 5.2$ ,  $SD = 1.8$ ), with a “medium” effect size ( $d = .69$ , 95% CI [.323-1.05]). The only geographic regions that showed statistical differences in the science identity subscale were OEs from the Northeast who showed significantly higher level of agreement on the science identity items ( $M = 5.9$ ,  $SD = 1.12$ ) than those from the Southwest ( $M = 5.3$ ,  $SD = 1.13$ ) with a “medium” effect size ( $d = .5$ , 95% CI [.17-.83]). Level of education was also marginally significant on the science identity subscale, only between OEs who had a non-degree certification ( $M = 5.1$ ,  $SD = 1.2$ ) compared with OEs with a graduate degree with a “medium” effect size ( $M = 5.7$ ,  $SD = 1.1$ ,  $d = .5$ , 95% CI [-.1-1.1]). OEs who hold graduate degrees indicated a statistically significant higher level of agreement on science identity than those who do not have a formal degree. All other education category comparisons revealed “very small” effect sizes (Cohen’s  $d < .4$ ). Interestingly, OEs who identified as non-binary indicated lower levels of agreement with the science identity items ( $M = 4.6$ ,  $SD = .79$ ) than the OEs who identified as male ( $M = 5.8$ ,  $SD = .9$ ) with a “large” effect size ( $d = 1.0$ , 95% CI [.43-1.6]) and also with OEs who identified as female ( $M = 5.5$ ,  $SD = 1.2$ ) with a similarly “large” effect size

( $d = .8$ , 95%, CI [.25-1.4]). However, the number of respondents in the non-binary category ( $n = 5$ ) was too small to draw reliable conclusions. Due to the lack of statistically significant and reliable differences among groups, the demographic variables were not disaggregated, and results of each measure are presented considering the entire sample ( $N = 209$ ) of the confirmatory national survey.

### ***Means Comparison Among Quantitative Measures***

As a mixed methods approach was taken in the present study, both the quantitative and qualitative data were required to answer the research questions. *RQ1: How do outdoor educators' personal backgrounds influence their personal identities? RQ2: How do outdoor educators describe their pedagogical goals and positionality within their professional organization? and RQ3: How are outdoor educators' professional identities recognized?* The quantitative findings will provide a general view of OEs' perceptions of their personal and recognized positional identities. The qualitative phenomenological analysis will then provide context for the results of the survey measures.

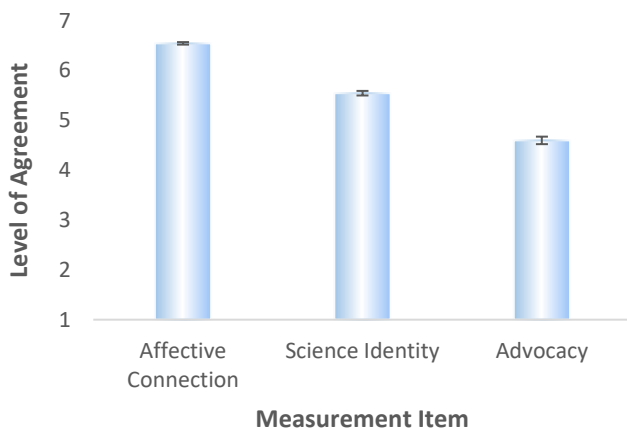
#### **RQ1: How do outdoor educators' personal backgrounds influence their personal identities?**

The factor analysis performed in the SEM identified the survey items that were associated with the latent higher order factor defined as "Personal Identity" in three distinct categories (subscales) that included OEs' science identity, affective connection with nature, and OEs' perception of themselves as advocates. OEs ranked how strongly they agreed with each item on a Likert scale of 1 (strongly disagree) to 7 (strongly agree). In addition to individual analyses, the items in each subscale were aggregated to calculate a composite score to compare the overall mean score for each subscale.

**Personal Identity Subconstructs.** The pairwise t-test revealed significant differences ( $p < .001$ ) among each personal identity category. Results indicate that OEs displayed a strong affective connection and personal association with being in the outdoors ( $M = 6.55, SD = .73$ ). While they agreed with the items that indicated an interest in learning about and studying science concepts, agreement was significantly lower in the science identity composite variable ( $M = 5.55, SD = 1.15$ ) than the affective composite variable ( $M = 6.55, SD = .73$ ). The OEs' responses to the advocacy items indicated the lowest level of agreement among the three constructs ( $M = 4.6, SD = 1.88$ ) (Figure 5.1). A pairwise comparison between each construct determined that the effect size between affect and advocacy was “very large” ( $d = 1.5, 95\% \text{ CI } [1.39-1.62]$ ), the effect size between affect and science identity was “large” ( $d = .8, 95\% \text{ CI } [.67-.88]$ ) and the effect size between science identity and advocacy was “medium” ( $d = .7, 95\% \text{ CI } [.62-.85]$ ).

**Figure 5.1**

*Comparison of Means  $\pm$  SEM of Composite Personal Identity Constructs*



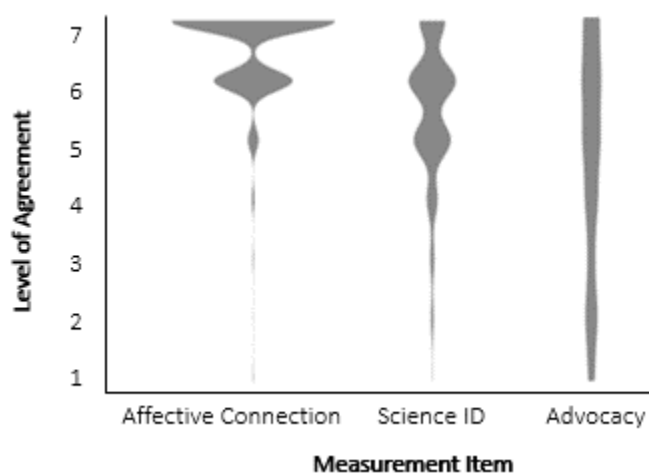
In addition to calculating the mean differences in responses, violin plots were generated to visualize the frequency distribution of the data (see Appendix J for chart of frequencies).

Figure 5.2 illustrates the skewedness of the affective responses. The majority of the responses

clustered around the agree to strongly agree categories. Responses for science identity were more evenly distributed among the three “agree” levels. The greatest range in distribution of responses occurred in the advocacy construct in which responses were distributed among the entire range of response options.

**Figure 5.2**

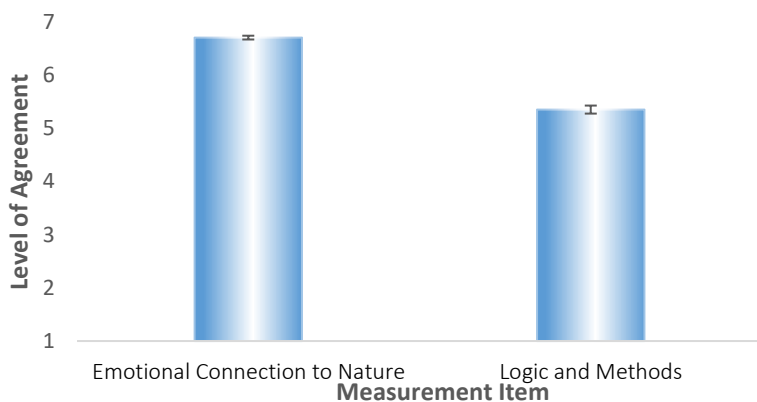
*Violin Plot of Personal Identity Composite Constructs*



***Affective Connection to Nature and Science Identity.*** The item on the affective connections with nature subscale, “*I feel a strong emotional connection with the natural world.*” and on the science identity subscale, “*The logic and methods used in scientific fields are exciting to me.*” exemplify the OEs’ personal identities orienting towards the affective dimensions more strongly than with a science identity (Figure 5.3). The mean response to the *emotional connection to nature* item ( $M = 6.7$ ,  $SD = 5.2$ ) indicated a significantly higher level of agreement than the *logic and methods* item ( $M = 5.4$ ,  $SD = 1.1$ ) with a “very large” effect size ( $d = 1.5$ , 95%, CI [1.3-1.7]).

**Figure 5.3**

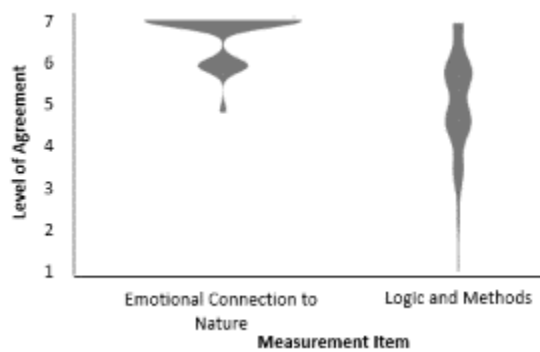
*Mean Comparison  $\pm$  SEM of Survey Items for Emotional Connection to Nature and Logic and Methods*



The violin plot (Figure 5.4) illustrating the response distribution of these two items displayed a similar distribution to the corresponding composite identity constructs, with the frequency of responses for the *emotional connection* item skewed towards the “Strongly agree” categories and the responses to the item regarding the OEs’ interest in *logic and methods* was more evenly distributed among all the response option categories. A paired t-test revealed the difference was highly significant at the .01  $\alpha$  level ( $p < .0001$ ).

**Figure 5.4**

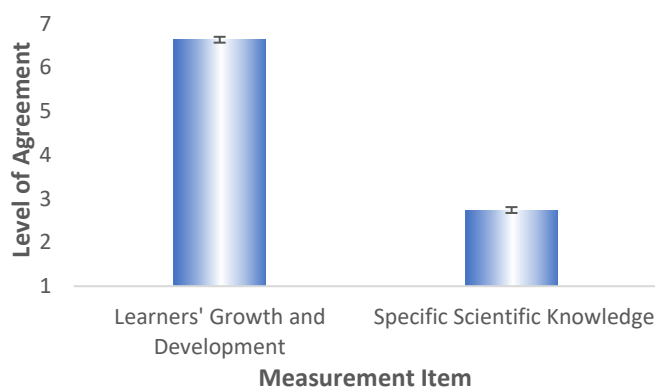
*Violin Plot of Survey Items for Growth and Development and Logic and Methods*



OEs responded with significantly stronger levels of agreement with all of the affective, socio-emotional measures than with the science identity items. The item, *“The work of an outdoor educator is important for learners' growth and development.”* (M = 6.64, SD = 5.5) compared with the item, *“I would rather participants leave my programs with specific scientific knowledge than with positive feelings about the environment.”* (M = 2.74, SD = 1.26) exemplified this trend (Figure 5.5). A paired t-test revealed the difference was highly significant at the .01  $\alpha$  level ( $p < .0001$ ). The scientific knowledge item was not included in the final model due to a low factor loading on the science identity subscale, however, the data were analyzed as they illustrate the trend in the data reflecting the OEs' greater agreement with the affective items than the science related items.

**Figure 5.5**

*Mean Comparison  $\pm$  SEM of Growth and Development and Specific Scientific Knowledge*

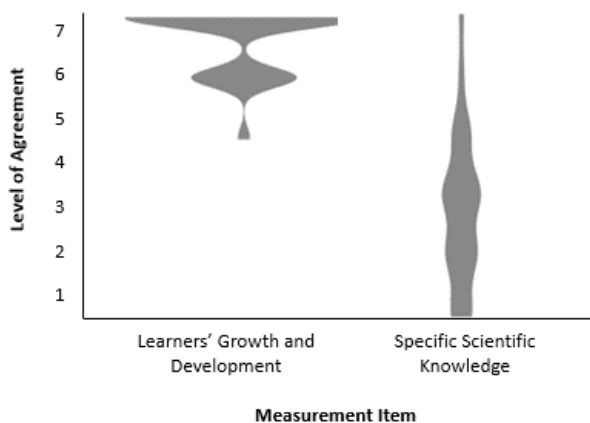


The violin plot in Figure 5.6 displayed a similar distribution as the composite identity constructs, with the highest frequency of responses in the “Strongly agree” category on the *Learners' growth and development* item, which correlates with the affection connection with nature identity construct identified in the factor analysis, and lower levels of agreement on the

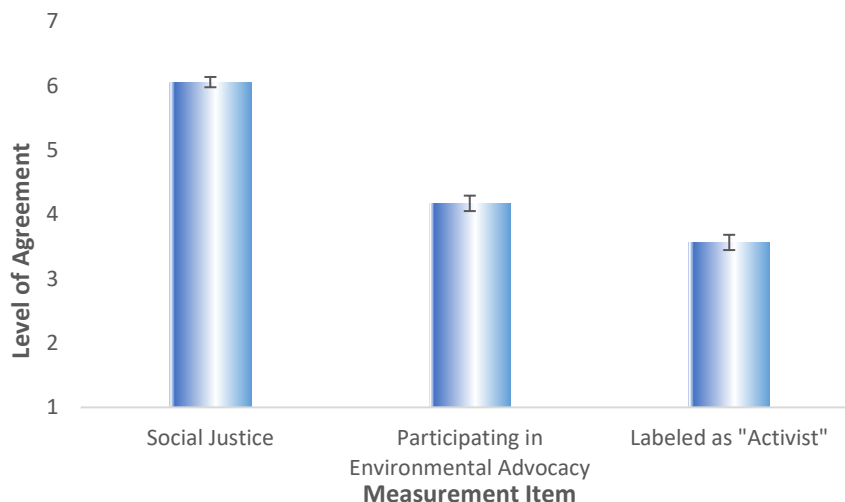
*scientific knowledge* item which is associated with the science identity factor. This follows logically as one's personal identity would likely influence how one is oriented to their professional role.

**Figure 5.6**

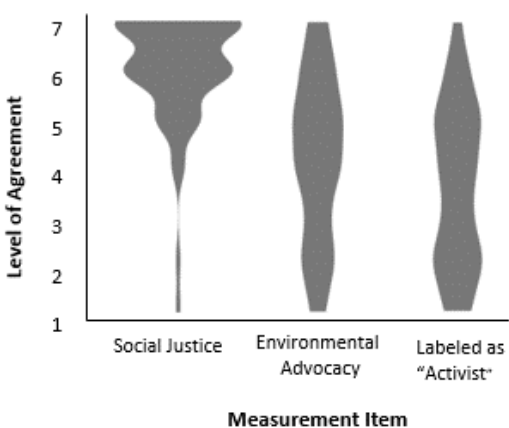
*Violin Plot of Growth and Development and Specific Scientific Knowledge*



**Advocacy.** The composite variable for the advocacy items indicated the lowest levels of agreement of all the personal identity measures ( $M = 4.6$ ,  $SD = 1.88$ ). Within this subconstruct, OEs responded with the highest level of agreement on the item, “*Advocating for social justice is important to me.*” ( $M = 6.1$ ,  $SD = 1.2$ ) and with less agreement on the item, “*I participate in environmental advocacy activities such as demonstrations or marches.*” ( $M = 4.2$ ,  $SD = 1.7$ ). The lowest level of agreement was on the item, “*People often label me as an activist.*” ( $M = 3.6$ ,  $SD = 1.7$ ) as seen in Figure 5.7. There was a “very large” effect size between the *social justice* item and the *participating in environmental advocacy* item ( $d = 1.6$ , 95%, CI [1.4-1.8]) and between the *social justice* and being labeled as “*an activist*” ( $d = 1.2$ , 95%, CI [1.0-1.4]). The effect size between the *participating in environmental advocacy* and being labeled as “*an activist*” was “small”, ( $d = .4$ , 95%, CI [.2-.6]).

**Figure 5.7***Means Comparison  $\pm$  SEM Among Advocacy Items*

The distribution of responses among the advocacy items appears to further illustrate the OEs' social-emotional orientation as the responses cluster around the "agree" to "strongly agree" for the *social justice* item compared with the other two measures in which the responses are more evenly distributed among all categories (Figure 5.8). The feeling of being perceived as an activist displays the greatest number of "disagree" responses.

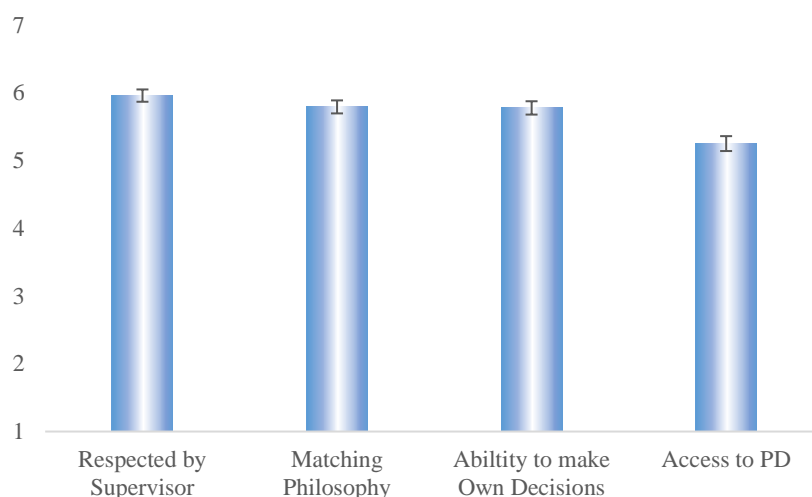
**Figure 5.8***Violin Plot of Advocacy Items*

**RQ2: How do outdoor educators describe their pedagogical goals and positionality within their professional organization?**

**Organizational Position.** The factor associated with organizational position included the items, “*I am respected by my supervisor*” (M = 5.96, SD = 1.32), “*My educational philosophy matches the mission of the organization with which I work*” (M = 5.78, SD = 1.39), “*In most situation, I have the ability to make my own decisions*” (M = 5.79, SD = 1.39), and “*I am encouraged to do as much professional development as I would like*” (M = 5.25, SD = 1.62). All of these items indicated moderate to high levels of agreement on the perception of having professional autonomy and respect within their organization (Figure 5.9).

**Figure 5.9**

*Mean Comparison ± SEM Among Organizational Items*



The means separation did show statistically significant differences between OEs’ feelings of being respected, having the ability to make decision, and not feeling that they are able to

participate in the professional development as seen in Table 5.2, these differences were only marginally substantive with each pairwise comparison indicating medium to low effect sizes.

**Table 5.2**

*Pairwise Comparison of Organizational Items*

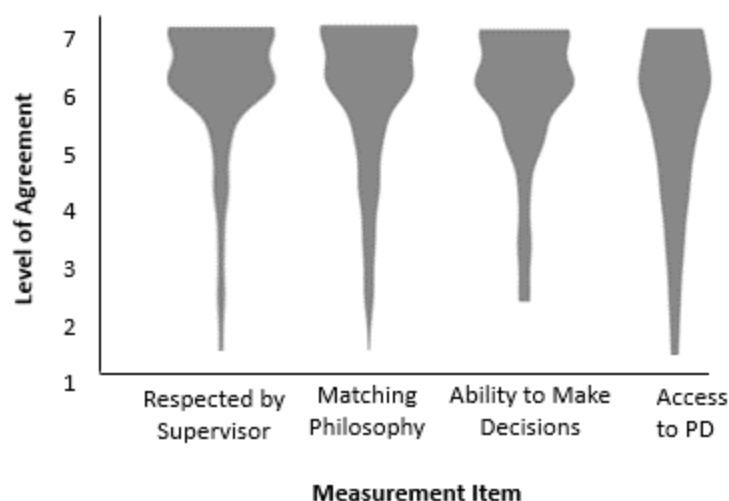
| <b>Pairwise Effect Size Comparison</b>   |  | <b>P value</b> | <b>Cohen's d</b> |
|--|--|----------------|------------------|
| I am encouraged to do as much professional development as I would like.              | I feel respected by my supervisor.   | <.0001         | .5               |
|  | My educational philosophy matches the mission of the organization with which I work. | .002           | .4               |
|  | I have the ability to make my own decisions.   | .006           | .4               |
| I feel respected by my supervisor.   | I have the ability to make my own decisions  | .20            | .1               |
|  | My educational philosophy matches the mission of the organization with which I work. | .23            | .1               |
| My educational philosophy matches the mission of the organization with which I work. | I have the ability to make my own decisions.   | .91            | .01              |

The violin distribution in Figure 5.10 indicates clustering around the higher levels of agreement in all items, with greater variability on the items measuring the ability to participate in professional development. This distribution suggests a similar trend seen in the legitimacy construct, indicating a disassociation between OEs feeling respected individually on a

microlevel, but not translating to the same feeling of agreement of being treated as professionals on the more macro-organizational level.

**Figure 5.10**

*Violin Plot of Organizational Items*



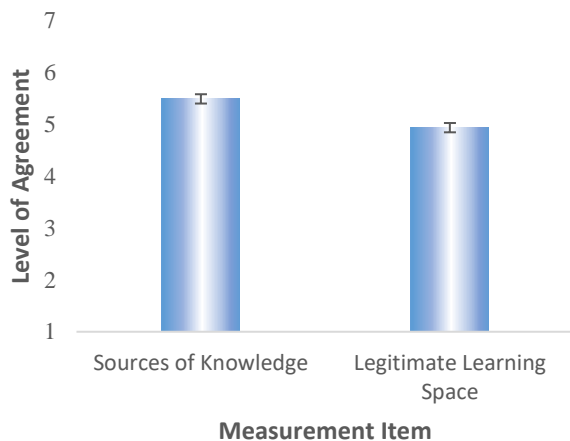
### **RQ3: How are outdoor educators' professional identities recognized?**

Research question 3 was primarily addressed by measures that loaded on the factor associated with the latent variables of professional legitimacy.

**Professional Legitimacy.** In response to how OEs see themselves in relation to formal educators with whom they work, responses indicated stronger agreement with the item “*Formal educators look up to me as a source of knowledge.*” (M = 5.49, SD = 1.97) and lower levels of agreement on the item, “*Educators see the outdoors as a legitimate learning space.*” (M = 4.94, SD = 1.29). Cohen’s *d* indicated a “large” ( $d = 1.03$ , 95% CI [.83-1.23]) effect size between these two measures, suggesting an interesting dichotomy in the cultural definitions of knowledge and education (Figure 5.11).

**Figure 5.11**

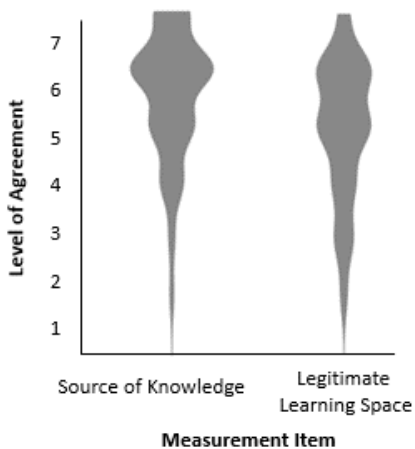
*Mean Comparison  $\pm$  SEM Between Source of Knowledge and Legitimate Learning Space Items*



The frequency distribution in Figure 5.12 illustrates the responses to the measure of OEs feeling that they are perceived as a source of knowledge clustering around the “agree” to “strongly agree” categories whereas there is a more even distribution in the level of agreement among respondents regarding the feeling of the outdoors being a legitimate learning space.

**Figure 5.12**

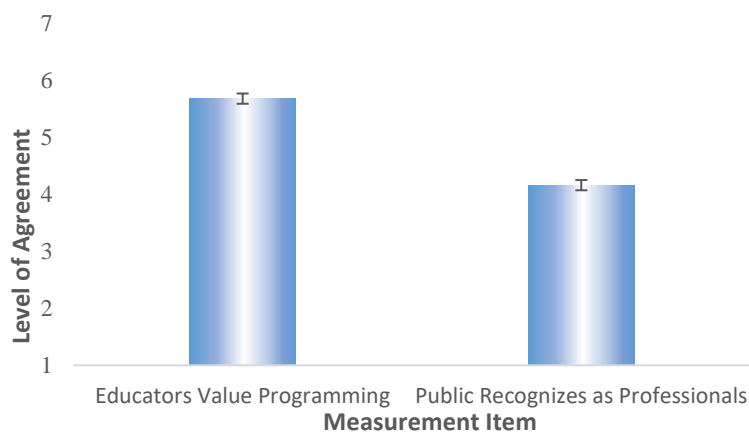
*Violin Plot of Source of Knowledge and Legitimate Learning Space Items*



Respondents indicated agreement that they felt that other educators saw value in their programming, as indicated in the item, “*Other educators see value in the programs that I lead*” (M = 5.67, SD = 1.16) but showed significantly low levels of agreement about the statement that they felt recognized as occupying a professional role as an educator by the public as seen in the item, “*I feel recognized as a professional by the general public*” (M = 4.16, SD = 1.51) (Figure 5.13) with a “large” effect size ( $d = 1.17$  95% CI [.97-1.37]).

### Figure 5.13

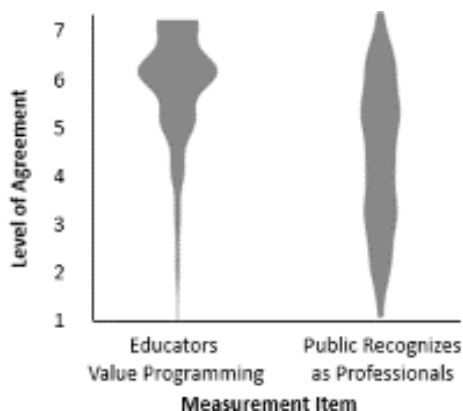
*Mean Comparison  $\pm$  SEM Between Educators Value of Programming by Educators and Recognition by the Public Items*



The violin plot in Figure 5.14 displays responses for the OEs’ perception of their programs being valued by other educators clustering in the “agree” category, but more of a spread in the distribution on agreement regarding the OEs’ feeling respected as a professionals by the public.

**Figure 5.14**

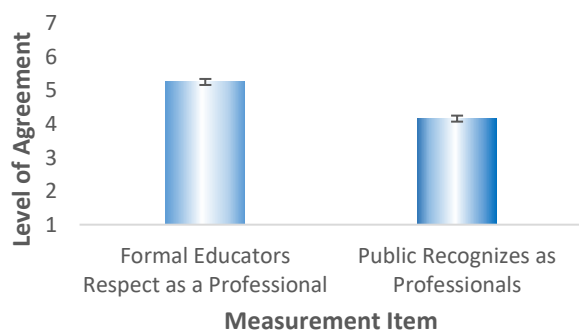
*Violin Plot of Value of Programming by Educators and Recognition by the Public Items*



Similarly, OEs responded with significantly higher levels of agreement on the item “*Formal educators respect me as a professional (in my role as an outdoor educator)*” ( $M = 5.25$ ,  $SD = 1.3$ ) than the item regarding the public perception of them as education professionals as indicated by the item, “*My profession is recognized as being part of the education profession by the general public*” ( $M = 4.16$ ,  $SD = 1.51$ ) with large effect size, ( $d = .8$ , 95% CI [.97-1.37]) as seen in Figure 5.15.

**Figure 5.15**

*Mean Comparison  $\pm$  SEM Between Recognition by Formal Educators and the General Public Items*



The violin plot in Figure 5.16 displays the frequency distribution of OE responses to the items regarding their perception of being respected as professionals from formal educators and by the public. OEs' responses indicating their perception of being valued as a professional within the educational ecosystem cluster in the "agree" categories but presented more of a spread in the distribution on levels of agreement regarding the OEs' feeling respected as professionals by the public.

**Figure 5.16**

*Violin Plot of Recognition by Formal educators and the General Public Items*

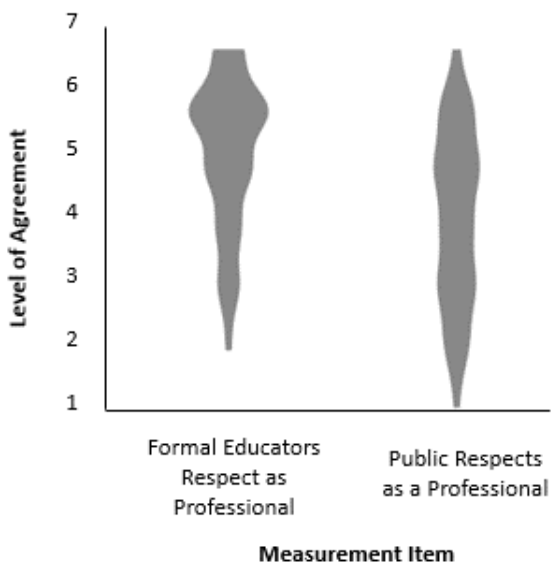


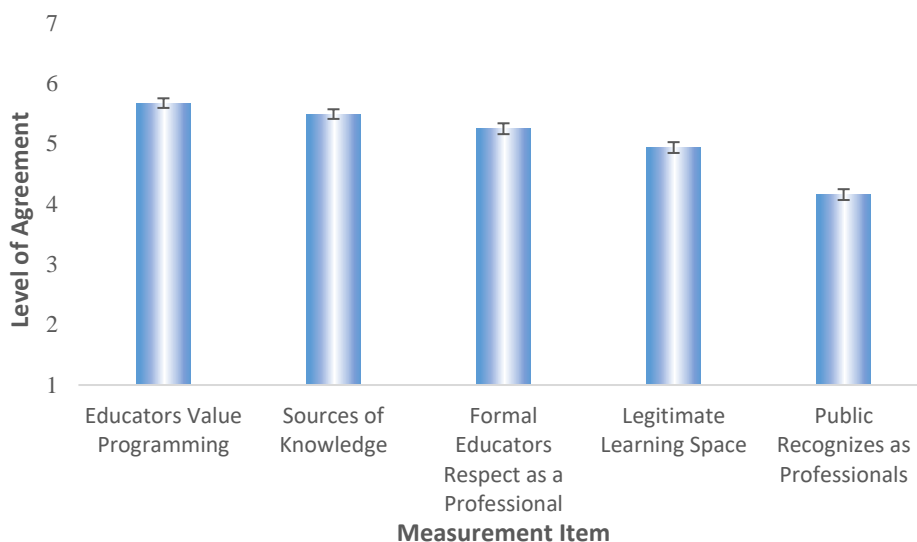
Figure 5.17 shows an interesting progression of this apparent dissociation between perceived value of their program content by other educators and their perceived professional status by the other educators and by the general public. OEs indicated higher levels of agreement on their programming being recognized as valuable by other educators and significantly lower levels of agreement on feeling that the outdoors is perceived as a legitimate learning space, and even lower levels of agreement on feeling recognized as professionals in educational contexts by

the public. The largest effect size can be seen between “*I feel recognized as professional by the general public.*” and “*Other educators see value in the programs I lead.*” ( $d = 1.17$  95% CI [.97-1.37]) and “*Formal educators look up to me as source of knowledge.*” ( $d = 1.02$  95% CI [.83-1.22]).

Table 5.3 presents the effect sizes of the  $p$  value of the mean differences. OEs responded with significantly lower levels of agreement and the greatest frequency distribution on the item measuring being recognized as professional educators by the public than all the other items in the professional legitimacy construct.

**Figure 5.17**

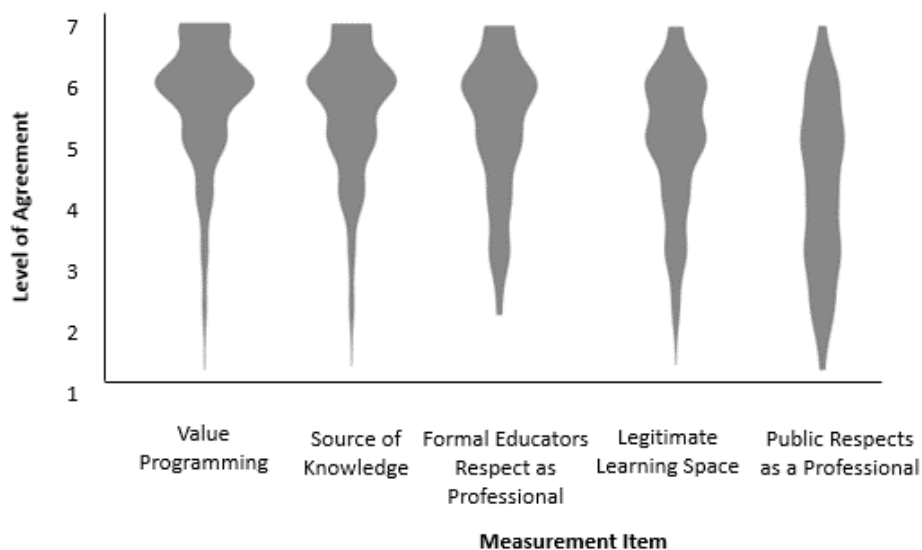
*Mean Comparison  $\pm$  SEM Among Professional Legitimacy Items*



**Table 5.3***Pairwise Effect Size Comparisons for Legitimacy Items*

| <b>Pairwise Effect Size Comparison</b>                     |  | <b>P value</b> | <b>Cohen's d</b> |
|--|--|----------------|------------------|
| Other educators see value in the programs I lead.          | I feel recognized as a professional by the general public. | <.0001         | 1.17             |
|  | Outdoors seen as a legitimate learning space.              | <.0001         | .6               |
| I feel recognized as a professional by the general public. | Formal educators look up to me as source of knowledge.     | <.0001         | 1.02             |
|  | Formal educators respect me as a professional.             | <.0001         | .8               |
|  | Outdoors seen as a legitimate learning space.              | <.0001         | .6               |

The frequency distribution in Figure 5.18 further illustrates how OEs' perception of the "value" and "source of knowledge" variables cluster around the "agree" to "strongly agree" categories while responses to feeling respected as an educator by formal educators, the outdoors being a legitimate learning space, and feeling respected by the public as a professional are more variable.

**Figure 5.18***Violin Plot of Legitimacy Items**Correlational Analysis of Quantitative Measures*

The data were primarily analyzed through means separation as the purpose of the survey was to develop a measurement instrument to characterize the identity constructs. It was not meant to serve a predictive function. However, multiple regressions and correlations among the measures were assessed to determine if the items were predictive and could be relational. Figure 5.16 illustrates the correlations among the items. The items primarily correlate with those within the same factor with few significant correlations among items within other factors. There were a few items that did show significant correlation at the  $p < .001$  level such as Sci2, “*I spend my free time trying to find out more about science and science related topics*” and the advocacy items. To investigate this relationship, the science item was regressed on each advocacy item and also on advocacy as a combined composite variable. While statistically significant, ( $F(1, 625) = 35.63, p < .0001, R^2 = .06$ ). this relationship only explained 6% of the variation within the data. The composites of the science construct and the composite advocacy resulted in ( $F(1, 1879) =$

35.06,  $p < .0001$ ,  $R^2 = .02$ ), explain only 2% of the variation. A similar trend was found when Sci2 “*I spend my free time trying to find out more about science and science related topics*” and the affect variables were regressed ( $F(1,834) = 42.81$ ,  $p < .0001$ ,  $R^2 = .05$ ). The items have a positive association as demonstrated by Pearson’s  $r$  coefficient (Table 5.4), but they are not predictive

Table 5.4

*Inter-item Correlations and Descriptive Statics*

| Variable | Variable |         |         |         |         |         |         |         |         |       |         |         |         |         |         |         |         |         |      |  |
|----------|----------|---------|---------|---------|---------|---------|---------|---------|---------|-------|---------|---------|---------|---------|---------|---------|---------|---------|------|--|
|          | 1        | 2       | 3       | 4       | 5       | 6       | 7       | 8       | 9       | 10    | 11      | 12      | 13      | 14      | 15      | 16      | 17      | 18      | 19   |  |
| Sci1     | 1        |         |         |         |         |         |         |         |         |       |         |         |         |         |         |         |         |         |      |  |
| Sci2     | .401***  | 1       |         |         |         |         |         |         |         |       |         |         |         |         |         |         |         |         |      |  |
| Sci3     | .387***  | .466*** | 1       |         |         |         |         |         |         |       |         |         |         |         |         |         |         |         |      |  |
| Aff1     | .292***  | .077    | .229*** | 1       |         |         |         |         |         |       |         |         |         |         |         |         |         |         |      |  |
| Aff2     | .162*    | .142*   | .238*** | .327*** | 1       |         |         |         |         |       |         |         |         |         |         |         |         |         |      |  |
| Aff3     | .148*    | .096    | .3***   | .38***  | .447*** | 1       |         |         |         |       |         |         |         |         |         |         |         |         |      |  |
| Aff4     | .038     | .104    | .112    | .05     | .321*** | .222**  | 1       |         |         |       |         |         |         |         |         |         |         |         |      |  |
| Adv1     | .017     | .171*   | .272*** | 0       | .214**  | .205**  | .307*** | 1       |         |       |         |         |         |         |         |         |         |         |      |  |
| Adv2     | .099     | .191**  | .334*** | .106    | .24***  | .185**  | .071    | .49***  | 1       |       |         |         |         |         |         |         |         |         |      |  |
| Adv3     | .016     | .155*   | .266*** | .055    | .182**  | .244*** | .107    | .426*** | .598*** | 1     |         |         |         |         |         |         |         |         |      |  |
| Org1     | -.015    | .09     | .105    | .061    | .115    | .127    | .157*   | .121    | -.078   | .074  | 1       |         |         |         |         |         |         |         |      |  |
| Org2     | .005     | .045    | -.02    | .118    | .205**  | .165*   | .19**   | -.063   | -.089   | .064  | .481*** | 1       |         |         |         |         |         |         |      |  |
| Org3     | .03      | .077    | .022    | .021    | .073    | .135    | .171*   | .077    | -.072   | .038  | .533*** | .472*** | 1       |         |         |         |         |         |      |  |
| Org4     | -.096    | .002    | .019    | -.024   | .151*   | .069    | .173*   | .008    | .002    | .069  | .355*** | .357*** | .504*** | 1       |         |         |         |         |      |  |
| Leg1     | .029     | .129    | .058    | -.009   | .065    | .125    | .062    | .1      | -.058   | .146* | .197**  | .111    | .197**  | .153*   | 1       |         |         |         |      |  |
| Leg2     | .087     | .149*   | .166*   | -.019   | .086    | .21**   | .084    | .212**  | -.004   | .131  | .16*    | .148*   | .245*** | .083    | .543*** | 1       |         |         |      |  |
| Leg3     | .041     | .115    | .128    | -.067   | .002    | .006    | -.066   | -.027   | -.058   | .012  | .054    | .079    | .013    | .125    | .43***  | .338*** | 1       |         |      |  |
| Leg4     | .069     | .205**  | .154*   | -.015   | -.027   | -.003   | -.058   | -.036   | .025    | .014  | .13     | .118    | .163*   | .243*** | .352*** | .345*** | .446*** | 1       |      |  |
| Leg5     | .102     | .224**  | .286*** | .077    | .104    | .193**  | .056    | .093    | .034    | .103  | .164*   | .204**  | .263*** | .168*   | .482*** | .505*** | .408*** | .439*** | 1    |  |
| Mean     | 5.84     | 5.35    | 5.44    | 6.42    | 6.71    | 6.42    | 6.64    | 6.06    | 4.17    | 3.56  | 5.79    | 5.78    | 5.96    | 5.25    | 5.67    | 5.49    | 4.94    | 4.16    | 5.25 |  |
| SD       | 1.17     | 1.09    | 1.13    | .81     | .52     | .91     | .55     | 1.15    | 1.73    | 1.71  | 1.39    | 1.33    | 1.32    | 1.62    | 1.16    | 1.2     | 1.29    | 1.51    | 1.3  |  |
| Skewness | -1.33    | -.64    | -1.08   | -2.29   | -1.52   | -2.59   | -1.16   | -1.96   | -.18    | .1    | -1.28   | -1.31   | -1.82   | -.91    | -1.24   | -1.01   | -.64    | -.14    | -.68 |  |
| Kurtosis | 2.14     | .46     | 1.75    | 9.67    | 1.38    | 9.22    | .34     | 5.2     | -.95    | -1.14 | .96     | 1.13    | 3.22    | .02     | 1.81    | 1.06    | -.19    | -.96    | -.34 |  |

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$

### ***Summary of Quantitative Results***

Survey items were analyzed with mean comparisons to quantitatively summarize OEs' perceptions of their personal and positional identities within the educational ecosystem. In response to *RQ1: How do outdoor educators' personal backgrounds influence their personal identities?* results indicate that OEs strongly affiliate with affective connections with nature and do not as strongly identify with seeing themselves as a *science person* or label themselves as *advocates*. Responses to *RQ2: How do outdoor educators describe their pedagogical goals and positionality within their professional organization?* and *RQ3: How are outdoor educators' professional identities recognized?* indicate that OEs feel their work is valued and formal educators within the educational ecosystem recognize their positional identities as professionals, but they do not feel as strongly that their position as educators is recognized by the public. Additionally, the demographic variables indicate little variation and demonstrate that the OE field is highly homogenous and overrepresented with White cis-gendered females. Results did indicate potential differences among gender identity categories, but because of lack of representation among the gender identity and racial/ethnic categories conclusions could not be drawn. However, this lack of representation in the OE field is well documented (Gress & Hall, 2017; Taylor, 2015) and the profession would benefit from further exploration of these findings in future studies.

### **Qualitative Results**

As the present study employed an embedded survey development mixed methods design (Creswell & Plano Clark, 2011) in which the qualitative portion is designed to provide deeper contextual understanding of the quantitative survey responses, the analysis of the phenomenological study was guided by the three main research questions which served an

organizing structure for both the survey development and the phenomenological analysis of OE identity. The results of the phenomenological analysis are presented below organized by each research question and the corresponding themes.

### ***Phenomenological Analysis***

The analysis of the interview transcripts followed the methodology recommended by Moustakas (1994) and van Manen (1997). First, each of the nine transcripts were read several times to become familiar with the content, then significant statements in relation to OEs professional identity formation were extracted and grouped into thematic clusters and consolidated into a concise interpretation of the experience. The interpretation was then checked with the participant to ensure validity and accuracy. From the nine transcripts, 442 significant statements related to OE identify formation were extracted. After redundant statements were deleted, the remaining statements were consolidated into units of meaning. The units of meaning clustered into 14 themes related to the three main research questions describing the development and enactment of OEs positional identities (Table 3.5).

### **RQ1: How do outdoor educators' personal backgrounds influence their personal identities?**

#### *Theme 1: Childhood experiences of time in the outdoors*

When discussing OEs' backgrounds and experiences that influenced their worldview and identity formation, memories of spending time in the outdoors during their childhood was a pervasive theme that was discussed among all the OEs. Much of the time this included sharing the experience with significant adult mentor figures who encouraged them, provided opportunities for them to experience the wonders of the natural world, and to view the outdoors as a place of refuge. The adult figure was often a parent or teacher, in all cases there was an adult who they respected that helped foster their connection to and curiosity about the natural

environment. Experiences included outings such as going on frequent family “bug walks.” One OE described the connection between these walks and subsequent interest in the outdoors, “When we would go for walks, we would just kind of look around and identify stuff and turn over logs and stop at the creek and so I guess that’s where my interest in being outside came from.” Another OE described family canoe trips on local rivers:

During the summers when I was 6, 7, 8 years old, we were probably on some river at least two or three evenings a week, because my parents both worked from home. So as soon as five o’clock hit they were done and we would throw the boat on the car, in fact the boat just lived on the car for the summer. We would throw a picnic and ourselves into the car and go to some local river and put in and paddle for a while, eat our dinner, paddle back, and go home and go to bed, so I spent a lot of time that way, sort of just being out, you know either in a boat or going for walks. (Carson)

Some recalled accompanying a parent on agricultural field extension outings or on outdoor sport activities such as playing golf with their parents. Most discussed that they ventured outside to avoid the chaos of home. Alex, a park ranger, explained, “I am the youngest of 10 children, I realized that those times that we were outside is probably because my mother needed it.” Logan similarly explained:

After my younger sister was born, I just did not want to be in the house that much while she was there because being a newborn is a lot...and I’m closer in age with my older sister, so we used to be outside a lot.

Carson, an aquarium educator, also discussed the idea of the outdoors being a refuge by describing how she internalized this orientation from observing her family’s association with the outdoors:

She [my mother] spent a lot of time outside because it was just a nice place, a nicer place to be and then inside the house. My grandparents were not the best parents ever, and so there was a certain amount of outside being the escape space.

The OEs often alluded to the outdoors as a quiet sanctuary where they described they could freely explore and find some peace. It became a spiritual home and they being a part of the natural ecosystem became part of their personal identity. Being outside was so ingrained in them that it was often described as just, “who I am.” Many went on to study natural sciences in school and university. They saw it as a natural flow and filled an innate need to be in and learn about the natural and biological phenomena that were such a large part of their childhood.

### *Theme 2: Nature as emotional support*

The idea of perceiving the outdoors as a source of emotional support was pervasive. Words such as “joy” and “peace” were used frequently. “The outdoors for me growing up meant fun, joy, relaxation and then as a teenager and a college student ... anytime I felt anxiety, I went outside it was just a natural thing for me” (Nicky). Jose elaborated on these feelings of emotional support in the outdoors:

It [the outdoors] sort of helps me center outside of the usual electronic distractions that you have at home and going back into centering yourself a little bit. I think the outdoors offers you that space to be surrounded by wonders and things that will be completely disconnected from the craziness. It's a place where you can develop yourself as a person and as a part of what is surrounding you.

This idea was echoed by Avery who explained that as a child, “I really derived a lot of energy from being outside, especially by myself.” Alex described the social emotional benefit of the experience of being in the outdoors as a support for managing stress and anxiety:

I have always tended to, even as a child, kind of box things up and make little scary boxes of things that I didn't know what to do with and through this journey [of mental health and mindfulness] I have practiced taking out those scary boxes and opening them up and going through it. And one of the things that I found that has truly helped me is when you're outside you don't feel like you're in a box and it makes it easier to feel like you can then handle your boxes. I don't know if this analogy is sticking, but you know, there's no borders to the outdoors. It's open air, you're out there, you're breathing it in, you're getting dirty, your hands are dirty, you're picking up animals, you're around them, you're surrounded by plants that are also living. And living box-free.

Cory described nature as “a companion.” All of the educators referred to the outdoors as a place to rejuvenate, find inner peace, emotional strength, and a place where they can both literally and metaphorically “breathe.”

### *Theme 3: Curiosity*

Another theme that emerged was the deep curiosity the educators have to understand the world around them. Alex, a park ranger, described a childhood experience:

Whenever a storm would come through and a tree would come down in the yard they [my parents] hired a tree company or something to clean it up, but then they'd leave the stump, and I remember there being multiple stumps in our yard that would last for a good couple years, but I would always kind of go up to them and just kind of watch and see all the bugs nearby and all the other critters. That really kind of stuck with me in terms of the fascination behind what's going on in this little microcosm of creatures and decomposition.

This sense of curiosity that was fostered in their childhood has persisted throughout their lives. Nicky, an informal outdoor science educator explained, “It’s my general personality to be inquisitive, to wonder, to observe, and just analyze. I guess you would say, that’s the part of who I am.” Avery described herself as, “I am just super curious person, I’m always learning about something, I’m always reading something.”

Several of the OEs discussed their innate curiosity that was nurtured by their outdoor experiences and fostered by supportive and equally curious adult figures. Avery’s father shared his enthusiasm for the natural environment with his children on their daily “bug walks.” As a volunteer chaperone on school field trips to the local nature preserve, he modeled his excitement in exploring nature. Carson’s, an aquarium educator, parents kept an encyclopedia and various nature identification books at the dinner table to encourage inquisitive conversations about their outdoor observations. Others did not mention having directed intentional support to nurture their curiosity, but they discussed the affordance of being able to freely explore the outdoors to discover and bring home animals and objects they found during their exploration.

In this study, the OEs’ parents fostered their curiosity by encouraging time spent in the outdoors. Many of the OEs recalled frequent family vacations to the mountains or beaches. Others discussed accompanying parents on work or sports excursions which provided the experiences to explore the natural world.

#### *Theme 4: Connection to nature*

In interviews, many of the OEs described how their own emotional connections to the outdoors informed their identities:

There's definitely a need in me that only nature can fill. And I dare say, from my perspective, in my experiences, it seems to me that humans have that need, there's a need in us to get outside...that's part of who I am (Nicky).

Other OEs, like Jordan echoed that sentiment:

I do think that all outdoor education speaks to the need for us as human beings to get outside and be in nature, getting kids away from screens and getting outside and using our hands and making sure that we're getting some vitamin D and having a good time. I always feel a little bit better when I am out in nature, and I want to share that with students.

One OE, Avery, the owner of a nature education business, explained the connection to working and teaching in the outdoors, “Absolutely is who I am and even just, I remember thinking as a kid looking out the window and just saying, ‘What if this is the last sunny day on earth, and you spent it indoors? And I would go outside.’” Avery further explained:

I consider myself as part of the ecosystem. I think too many humans do not, so they don't think they have an effect on life, natural life, and they don't know the role that natural life plays in their life and it's a complete disconnect. I think I am directly connected to the outdoors.

Carson also expressed this connectedness:

I am someone who has always seen humans as another animal. I have absolutely no problem with the idea that we are animals, we are mammals. We're much more like other mammals than we want to admit. I love it when there turns out to be some animal that we thought couldn't use tools or something like that and they turn out to do some incredibly clever thing. I love that stuff to kind of knock us off a peg as humans, because we're not

that special. I think I've always been somebody who loved the idea that we are embedded in the natural world not separate from it, and that we share space.

The idea that humans are part of the ecosystem and not apart from it was a common view expressed by the OEs. Each OE mentioned this idea of biophilia, the innate human need to connect with nature and other living beings (Kellert & Wilson, 1993). Some OEs connected to the natural world through food systems, others through learning about ecosystem function, but all discussed that they see the outdoors as fundamentally part of who they are.

*Theme 5: Complex personal identities: Science as an attribute rather than an identity*

When asked to choose a label for themselves among *scientist, advocate, or nature person*, many of the OEs could not choose one label and explained that they identify with dimensions of each of the labels. For example, while much of their outdoor instruction related to science, few OEs in this study described themselves as “science people” or “scientists.” Even though many had a background in science and extensive scientific knowledge, they hesitated to primarily identify themselves as a scientist. Nicky explained: “I taught science for forever, but I don't really [see myself as a scientist], I mean, I'm a scientist from the point of view I ask questions.”

Regarding how others view their roles, while none of the OEs defined themselves as scientists, they described how others see them as science people. Carson said:

I'm the friend who, if you have some random science question that pops up like you hear something about some animal or some other science thing and it doesn't have to just be about animals, it could be climate related and you wonder, ‘Is that true?’ I'm the friend you text because chances are I've read about whatever it is. I am the encyclopedia. People see me as somebody who just collects a lot of knowledge about a lot of things.

Avery described a recent experience, “My niece calls me, she got her blood drawn the other day and she wanted to know how she was going to make more red blood cells, like that's how people certainly think of me.”

The OEs described that other recognize them as scientists and see them as keepers of scientific knowledge, but the identity to which eight of the nine most often selected was “supporter” and “steward.” Cory said, “That is what inspired me to do this, I see myself as a steward.” Nicky elaborated:

... I am a supporter. Now I don't know, an advocate maybe. Based on my experiences, advocate might be a little bit strong...but I will take up a cause for sure and it usually comes back around to if something's unethical.

Many OEs started their careers in scientific fields of study and realized it was not the science as a discipline that they were attracted to but rather the ability to use their knowledge to provide people with the tools to support their journeys in developing a relationship with nature. Logan revealed that his experience in environmental engineering and the science courses in college informed his decision to not pursue science as a career:

I'm not much of a science person, like in working with data. I briefly thought about trying to be like a wildlife biologist or something. But I think I'd be terrible at it. I'm okay with numbers [but I prefer] trying to get other people excited about the environment.

Like Logan, several of the OEs discussed their engagement in scientific activities as a part what they did, but not core to their identity, “It was a lot more, like we [my family] liked the science, but that wasn't why we were there [the outdoors]. It was more like, we would learn something science-y because we had a question, but that wasn't why we were there” (Carson). Even Jose,

who is employed as a research scientist/extension agent, discussed the ability to bring joy and provide support to the participants, not providing scientific knowledge, “Just seeing people being happy receiving information or being appreciative of receiving this information that they were going to bring to the farm, and to better their income, their lives, their crops. It was very satisfying.”

Each of the OEs resisted defining themselves with one specific label such as a “scientist” or “advocate” or even “teacher”. They preferred more ambiguous self-descriptions such as rather being labeled as a scientist, Nicky referred to the personality trait of, “I’m going to be the one that’s going to be questioning,” and rather than the label of educator, Avery explained, “more as a learner than an educator.” Carson made the distinction of being an educator, while not necessarily a teacher. The OEs’ collective hesitation to fit into one singular labeled identity is reflective of the integrative, multi-dimensional nature of the profession as illustrated in the outdoor learning model depicting the overlapping of the three (cognitive, affective, psychomotor) learning domains (Spiteri, 2020). These educators’ personal identities are a complex amalgamation of dimensions that are intersecting but not defined by any single one.

**RQ2: How do outdoor educators describe their pedagogical goals and positionality within their professional organization?**

*Theme 6: Influential experiences that led to OE as an identity*

Throughout the interviews, OEs described that the primary influence that led them to pursue a profession in the outdoors was their time spent in nature with family or a significant adult who modeled a deep connection to and inquiry about the outdoors. When asked about people who were most influential in their lives and contributed to their professional identities, Avery referenced childhood memories of family nature explorations describing their “bug

walks” and responded, “My interest in the outdoors certainly stemmed from my dad”. Similarly, Nicky replied, “Well, I already mentioned my family was very close, so that immediately would be number one [influence].” Carson, agreed, “I mean definitely [influences were] my parents.”

Carson and Alex also cited their teachers as being heavily influential in their decision to pursue a career in outdoor education. Carson discussed that in addition to their parents, “As far as people, honestly, a lot of them were my science teachers.” Alex, a park ranger, also talked about teachers as influences. Common among the OEs when discussing their science teachers as influential, was not the science content but the description of their deep passion for their teaching and connecting with students.

While it was the people in their lives who sparked the initial interest in a career in educating in the outdoors, what ignited their passion to pursue and persist in outdoor education as a career was the OEs’ desire to provide experiences for others similar to those that they remembered from their childhoods. The idea of inspiring people and providing positive lasting experiences was common among all of the OEs but were manifested very differently among each of them.

Quinn, the museum/garden educator, who came to outdoor education through a career as an artist and dancer highlighted sharing the love of martial arts as a primary influence for the interest in educating through nature:

Bruce Lee was the largest influence in my life...most of those old Kung Fu movies represented some sort of animals in their martial arts. So that's where the idea came from. It was like, ‘Wow, they can do that in China, why can't I do it [connect people with nature through movement] here?’ I combined my martial arts with the science and the natural world...to help [students] grow and learn.

In many of the interviews, the OEs described how their early experiences of igniting growth and excitement with the participants in their programs reinforced their career decision. Jose explained that contributing to learners' growth and development was influential in the decision to become an OE:

A huge influence on why I like working like this [as an extension agent] was when I had the opportunity to teach one of my first classes. It was a hard class to teach but at the end, one of the students came to thank me because he felt that the information that he received was not only applicable to just taking the test, but it was something that would be useful for his life.

Logan, an education director at an outdoor learning center, discussed a first experience teaching a program in the outdoors as influential in their OE identity formation. The program was teaching about tree identification. The excitement and joy that a child exuded during this experience and the satisfaction of creating a positive experience in another's life was what Logan remembered most and reinforced the decision to pursue outdoor education as a career:

She's like, 'Wow!' And she was chanting along what the trees were, and she remembered them all... and I thought, there's no better feeling than this. This is what I should be doing, what I really want to do.

Nicky also mentioned that seeing the connection between students' excitement and eagerness to learn through nature experiences influenced the decision to pursue a career as an OE. As a classroom teacher they were given the opportunity to raise trout from eggs in the classroom in a large aquarium. As the students' cared for and raised the fishes, their interest and enthusiasm for understanding classroom earth science concepts deepened. When discussing concepts of droughts and the practice of seeding clouds to produce rain, the students asked, "How's that

gonna affect the fish in those rivers? What is it going to do to what lives there?” After hearing the students’ reactions, Nicky mused:

I never had students ask those questions, but because they took care of those the eggs and raised trout, it gave them a whole other perspective to apply to other things, so the whole aquarium launched me into this thought on getting them to the nature park. Doing that kind of teaching really is what launched me to leave the classroom to become an outdoor educator.

Alex, a park ranger, described an experience taking students to the ocean to learn in the outdoors:

Many of the kids just stood there with their eyes wide open and mouths open, and I didn't know what to say, because I didn't know what they were doing. Then it hit me, these kids had never seen the ocean before and they live right there. That meant a lot to me. And then recognizing my own privileges, you know, my folks didn't have tons, but they were able to do those trips like the Cape Hatteras experience, and that was an experience that I was able to have, and these kids don't have that, and they live here. This is their beach more than it is mine!

Alex’s description of the privilege of being in nature as a child reinforced the goal to share such experiences with others.

The OEs described both memories of time in the outdoors as children and their early professional experiences as the impetus for the realization that teaching in the outdoors was more than a job, it was a “calling” and a “responsibility” and a large part of their identity. The experience of inspiring “Aha!” moments for people, the sense of awe, and providing the opportunity for people to develop a sense of connection to their local natural environments both influenced and reinforced their professional identities as OEs.

*Theme 7: Teaching philosophy*

The OEs in this study credited their childhood experiences in the outdoors that allowed them time and space to freely explore and follow their curiosity as a significant part of how they developed their identities as educators, their teaching philosophy, and their position in the educational ecosystem. Each OE described their childhood as roaming in the open natural spaces near their homes. Alex described childhood experiences in the outdoors as, “more of an exploratory kind of vibe I guess.” Similarly, Quinn discussed, “Just being in the country and my parents gave me the freedom to run outside in the woods. Logan also explained, “I was very fortunate that I had that flexibility and freedom growing up.”

In addition to childhood experiences influencing their exploratory, student-centered teaching philosophy, Avery described an experience in a college field botany class where the professor modeled this type of teaching by allowing the students to abruptly stop class to watch whales migrate:

We were in a botany class, and we were all looking for plants. And somebody called “Whales!!!” ...So, we all went to the beach and watched the whales migrating North from Mexico, which was just awesome. It was just this moment, right? It's like you're supposed to be doing something and then you just witness this miracle of life passing before your face. Maybe that's where I get this idea that, if you're outside with kids and something happens, you stop. I mean you can't *not* watch whales because you are looking for California poppies or something.

This teaching philosophy of encouraging curiosity and wonder was similarly expressed by the other OEs. Alex, a park ranger and educator, explained, “I like finding out the answer to

questions that I have and more than that, I like helping other people find out the answer to questions they have.” Alex further explained:

I want my programs to involve the public and not just in touching antlers and pelts, I want their brains to be involved. I want them to be thinking, actually thinking about, why don't I see antlers after they fall off in the middle of the woods? I want them to ask these questions themselves. I give them a few hints... I want to lead people to the answers or the ways that they can find the answers themselves.

Carson explained that inspiring students and program participants to appreciate the natural world and building emotional connections is an important part of their teaching philosophy and identity as an OE as opposed to a classroom teacher by explaining:

I think most teachers know it's [emotional connection] incredibly important, but schools are not scheduled in a way that make it possible for that kind of experience to be common. I think there's so much emphasis on instructional time in school, especially in elementary school and honestly, I think that is part of the reason I am not a classroom teacher. I would have a really hard time being told that it's more important that I spend time on this specific content piece than reacting to the fact that the tree outside the window is beautiful.

Inspiring this emotional connection is a central pedagogical theme that was common among all the OEs. Throughout the interviews, the OEs discussed that the central focus of their philosophy of teaching and learning is to inspire curiosity, active thinking and wondering, and having the freedom to be immersed in and be part of the learning environment, both cognitively and emotionally.

*Theme 8: Integrative, whole child education*

When asked about their roles as OEs, the participants in this study described how their programs connect with multiple areas of learning. Despite that their instruction was frequently labeled by others as science instruction, many of the OE explained their views about outdoor learning as integrative and essential for students' growth and development within and beyond the school curricula. Outdoor settings can be used to teach and integrate multiple skills. In response to the question regarding their role as and OE, Avery explains:

My lessons are very interdisciplinary I believe that you can use nature to learn to read and count and do all those wonderful things, and so we do, we practice life skills while studying nature. I think nature can be a motivator. I don't think they have to be separate. I don't think you have to learn math in math class and nature and science class.

Jose, an extension agent, also described teaching as integrative and supportive, "I think that outdoor education is what translates formal education into practical uses for that information."

Jordan, a garden educator who works with schools, described the value of incorporating nature as a setting for engaging with the curriculum:

When teaching kids how to garden, there's so much involved in math and science and history and language arts. I mean really the garden and the kitchen is all encompassing ... for example in English language arts, there are certain words that we can touch on from the classroom and repeat in the garden during a specific lesson to help with the student's vocabulary. Maybe in math, times tables are a big thing, so we can do some work in the propagation tables and talk in six packs and talk about times tables that way, so little connections like that.

Avery explained providing opportunities to promote fundamental life skills that span beyond curricular areas and address healthy child development:

I really think of myself as teaching skills, like next month we're going to learn about mollusks and we're going to do a lot of sorting of shells... this month we're doing bees and we play a pollination game where they actually use these oversized forceps to pick up these pom poms and move them from flower to flower, so they are the bees themselves and that's a fine motor skill.

Jordan described similar ideas of holistic learning in the outdoors, "I think a lot of people underestimate all that goes into raising a child and making sure that they're nourished you know mind and body and that the garden was a great space [for that]."

Even though these OEs believe that outdoor, nature-based learning is integrative and can address more than the science curriculum, they recognize the expectations for emphasis on science and the need to adjust their programs to meet this expectation. Avery, who owns a nature program business that works with schools, explained, "My K through five [grade] programs are directly aligned with their [schools] science curriculum. So, I take their science curriculum and I put it in the context of nature." Nicky, an informal science educator, explained the importance of connecting to the science standards as critical for working with formal educators saying, "under today's pressures of testing, teachers are graded on what their kids do on the standardized tests, so connecting to science standards supports our work with schools."

Nicky further explained that they also use science as vehicle to connect students to the affective benefits of nature, including having time to slow down and just *be* rather than constantly *do*:

We do teach science from the science standards, but there's also time of reflection and we'll either do a quiet sit or quiet walk where we're not talking. It's your individual time to be outside and listen and look and then we reflect on that. The students say, "This is the most I've slowed down in forever." So that's a piece we're giving them. I'm not sure they're getting this [reflection time] through their school day, so connecting them to nature, slowing them down with the peace and joy along the way. That's a huge part of teaching in the outdoors.

Quinn, who works with community gardens also described the contribution of nature-based outdoor experiences to students' learning and development beyond the formal classroom. Discussing the observed change in students' behavior throughout the course of the garden-based programming, Quinn shared that aside from their learning, "they started treating each other better, started treating their families better, started eating healthier."

During interviews, the majority of OEs described a breadth of learning opportunities in the outdoors through the integration of content linking formal curricula with experiences in nature. The OEs described how outdoor experiences they provided contributed to the whole child's cognitive, affective, and social connections.

*Theme 9: Responsibility to educate about environmental literacy*

Another theme related to OEs' positional identities in the educational ecosystem centered around their sense of responsibility to provide information to support learners in making "good, healthy decisions" about their bodies and about the earth. Jordan, a school garden educator explained:

Because there's a big disconnect in our relationship with the earth and the importance of taking care of things, I think that when you're involved in growing food and taking care

of plants, you have a better appreciation of the relationship that we have with not only the plants, but everything that supports life on this earth. I think they'll [the students] be able to make better informed decisions about whatever may come up in their life, you know whether there's policy about protecting natural environments, or something like that they'll have a better understanding of the importance of making sure that we're taking care of the things that take care of us.

Avery similarly described introducing learners to environmental stewardship:

I think if people connected to it [nature] more on their school grounds and in their backyards and on their balconies and on their walks, they would make different decisions. It is not my job to tell them what decisions to make, it is my job to open your eyes to what's out there and then you can decide from there. I don't care if you're gonna be an engineer or doctor or working at the Walmart, everybody should have some environmental literacy because we are part of the ecosystem. It's not just the way I think, it is the absolute truth, and we make small decisions every day that affect that ecosystem in huge ways and just people do not see it that way at all.

Additionally, Alex discussed this sense of responsibility to support people in being active, environmentally literate citizens:

Whenever we are able to connect into their experiences and their passions... When they go vote... if they know the issues that they care about... say if there is a referendum or a wildlife something or other on the ballot, that's where the change happens in my opinion.

Logan described the sense of responsibility to increase environmental literacy as originating from growing up being exposed to 1990's popular culture that promoted environmental stewardship through recycling and conservation advertising campaigns:

A lot of those things that were kind of like worldish views in the '90's, about recycling, cutting up your soda can packets so the ducks won't get stuck in them, Captain Planet, all the talk about the ozone layer...and that we needed to do a lot more [to protect the environment] I think that was very influential on me. That we have this sense of responsibility for keeping this environment protected, and therefore the future and trying to teach for tomorrow's leaders.

Each OE had a different origin story for their sense of responsibility to raise environmental awareness. Some were political, some were rooted in a sense of social justice, and some were in resource conservation. Despite their disparate motivations, all were deeply passionate about their sense of responsibility to encourage people to see a personal connection and power to impact the world around them:

I think it is the most important thing in the world for everyone, everyone, but especially kids coming up now to understand how important it is to take care of this planet, love our earth, relish it. And relish it with the creatures we have crawling around and the plants we have growing and stop pollution. Be nice to each other and animals. It's just being a human being. (Quinn)

*Theme 10: Spreading learners' joy and inspiring "Aha!" moments*

Each of the OEs in this study described that seeing people "light up" when they assisted them in discovering something new or when they made a connection to the natural world as the source of their motivation to teach in the outdoors. Nicky, a former teacher, explained, "When I took my students to that nature park, and I saw kids light up outside in a way that [they] didn't in my classroom...and the joy." Alex echoed this idea with the comment, "Seeing those light bulbs;

it's those kinds of moments that I want to help create because those are the moments that I remember as a kid.”

The lightbulb, the sense of joy, and the enthusiasm that the OEs noticed when people were learning outside was a universal experience that the OEs discussed as their motivation and what drove their passion for their profession. Jordan described, “I think it was once I got into it and found the joy that I could get the sparks in a five-year-old when they try something new, and they actually really like it.” Carson explained, “I want people to have joy in the outdoors. I want people to find the thing, whatever the thing is that they connect to.” Logan explained, “Having those ‘Aha!’ moments from kids. Getting kids that are like, ‘this is cool, I don't want to leave. I don't want to do anything else.’ There's not much that tops that.”

Jordan mentioned that these transformative moments that participants experienced in the outdoors were unique to these spaces, “I see the ‘Aha!’ moments that we talked about, and the joy that is coming from the students out in the garden; the other [classroom] teachers, they don't see that all the time.” It is the spark of excitement and empowerment the OEs described as fueling their passion for work.

#### *Theme 11: Providing experiences to connect students with nature*

The OEs had a common goal of connecting students with nature to provide a space for relaxation, peace, and inspiration. They often discussed that the goal of their programming is to offer children the same positive, nurtured feelings that they felt they were privileged to have in their own childhood experiences in the outdoors. Nicky mentioned the goal of inspiring students’ spark for learning, especially those who struggle in the classroom. “When teachers say, ‘I’ve never seen this [enthusiasm] in the classroom’, that's a huge goal. Yeah, you've had a good day when that sort of thing happens.”

Avery discussed the goal as an OE to connect students with nature as:

I am trying to make people realize that nature is right outside their door, you do not have to drive to Yosemite, you do not have to drive to the mountains, you can go outside and all those wonderful bugs you think you need to kill with your pesticides are actually here for your benefit, and you are a part of their world, they are part of your world.

Alex, who's outdoor education program brings outdoor experiences to formal education partners, explained the deep responsibility to provide students formative nature-based experiences:

The goal, and the challenge is, can you take kids in these situations and I'm not talking about the privileged affluent ones, the ones that have the computers already, I am talking about the kids who don't have meter sticks, who have never seen the ocean, can you take these kids and rock their world in 30 minutes and make something last? This might be the only field trip they get this year, this might be the only chance to really get to experience something like this, so it has the potential to be really important for them.

Carson also discussed that their goal as an OE is to provide opportunities for students and program participants to experience the social-emotional benefits of connecting with nature:

Part of my desire to get kids out in nature and to get kids engaged in science is that I know that my experience as a child is not the norm, and it should be. I want more kids to have the experience of feeling safe in the woods, of knowing how to climb a tree, how to climb a rock, and having that expansiveness, even if it's your local park. It doesn't have to be wilderness, just having the sense that you can walk into a space and that space could feel like home. Everyone should get to experience that, and they don't.

Like the others, Quinn mentioned connecting students with nature through changing their preconceptions about their role in nature through the example of working with snakes:

Kids think snakes are bad, they're all bad, they're weird, they move funny, some of them are venomous, they can kill you. Trying to push that perception back, that they're useful within an ecosystem as both predator and prey... that's like a basic goal if I can get them to be more open to the environment. My secondary one [goal] would be that they've accomplished that sense of wonder, they've achieved that and now they're like "Okay, so this is a cool thing to have."

The goals and motivations of these OEs were described as providing a safe spaces and sense of connection similar to the experiences they had in their own childhoods.

### **RQ3: How are outdoor educators' professional identities recognized?**

#### *Theme 12: Relationship with formal educators*

The OEs in this study work with formal educators in a variety of extents and capacities and share a deep respect for classroom teachers. The OEs recognize how challenging, restrictive, and stressful classroom teaching can be. They discussed how they view their positions within the educational ecosystem not as competing to occupy the same space as classroom teachers but to be supportive and complementary. Carson noted this and recognized, "Teachers don't have time or space to do these affective "extra" things that outdoor learning can bring." Many OEs see their contribution to student learning as filling that gap that teachers know is important but do not have resources or capacity to do themselves within their strict guidelines. Jordan explained this appreciation for the demands of classroom teaching:

With formal educators, I would say that outdoor education is meant to enhance everything that they're doing, it's not meant to replace it at all. We are supporting the classroom because I do understand that teaching is very hard and with the standards that

we have for teachers with limited resources, it's really hard to get everything done that they need to. And there's a lot of pressure.

Carson further explained their support for classroom teachers:

I mean I have such deep respect for classroom teachers; part of why I am not a classroom teacher is that I could not do that work. I think it's a combination of the juggling the crazy politics. Just classroom management alone is huge, and so hard. I mean, especially those teachers who manage to make every student feel like that class was designed for them. Every student learns so differently, and you only have one of you and there's 20-something of them, and yet kids don't feel left out, kids don't feel dumb. They're brought along in those classrooms, and it feels like a community, and I've witnessed that so many times. I don't know how they do it and it's amazing...

One interview question asked the OEs to classify their relationship with formal educators as *colleagues*, *collaborator*, *visitors*, or *mentor*. While there was not a consensus about relationships, there was strong agreement that it is a complicated relationship and highly dependent on the context. None of the educators saw themselves as a colleague but they did all discuss that the goal was being a collaborator in student learning. Nicky explained, “[We try to] build a partnership with the teacher and the school, you know I give her my cell phone number she gives me her cell phone number. I’m a support person.” The OEs described how the value and perception of their identity varied in different contexts.

Logan explained:

I feel like it's a mix of the first three (colleague, collaborator, visitor). A goal would be more collaborator, but when I do field trips, it's more like a visitor because they're looking for an end goal, and that's it. I would love to get to a point of being a collaborator

with formal teachers, so that we can push this agenda further of adding more environmental education into the curriculum beyond science. I've seen that there's so much that we could utilize the outdoors for that is so meaningful and impactful.

Alex, who is a park ranger also struggled to define their relationship with teachers:

I think 'colleagues,' is too strong like it's too intimately related to what they do. But I think visitor is too far. So perhaps maybe like associates? Or I am trying to think of a word to put it somewhere in the middle. I think that they see what I do, respect to a degree what I do, and understand as well, because they are educators...my style of teaching is naturally different from theirs just based off the sheer difference of how we teach and our venue. I have to think about that, what would be a better word for associates? A mentor? A guide perhaps?

Avery added:

So definitely we're not colleagues...collaborator, for sure when they invite me in to collaborate. But I do not, I do not push it. I think that a lot of them think of me as like a mentor, some of them. The ones who want to learn more. Yeah, I'm kind of their "go to" for all things outdoors. They'll ask me questions or, like I said, I get more questions from the teacher sometimes than the kids. I think they know I'm there to support them, I think they know I'm not judging their classroom.

A common thread among all the OEs was that they saw themselves as complementing the teachers' work and filling the gap in meeting students' social and emotional needs that the formal education system is not designed to do. The OEs explained that teachers do not have resources or money to meet all the students' needs, so the OEs felt they could contribute by filling that need. Alex described OEs as "an untapped resource" to fill the gap and bridge the

indoors and outdoors and to help create those “Aha!” moments and get students excited and have access to the positive experiences that occur in the outdoors. In discussing the supportive relationship with classroom teachers that they hope to foster, Alex explained:

I would like to be better at connecting these programs that we're doing to the academic standards and actually writing out, ‘these are the standards,’ and then that way, when I get trip requests when teachers ask, instead of putting that burden on them, I can go and figure out what standards are being covered.”

*Theme 13: Lack of cultural understanding of outdoor learning in education*

When OEs were asked how they felt they were viewed by formal educators and by the general public, they described the lack of awareness that the public has for the outdoor educator profession. Logan said, “I get a variety of responses, responses like ‘Oh that's cool. What does that mean? You do that for a living? You get paid to do that?’”

Cory, who works as a ranger said:

I don't think they know what it is, so it hard to value what you don't see. It needs to become more visible, outdoor education jobs are hard to find, it's invisible to the public, people don't know it is a thing. When I tell people what I do, I say I am a ranger, then an outdoor educator, then the conversation usually stops. There are no more questions.

In the OEs' view, the public perception is that their jobs are interesting, but there is a limited awareness of the work of an OE. Alex, who is also a park ranger, explained:

I think that people in the community find it interesting. Because I think again, at first glance, when they see a ranger, they're thinking only cop, they are not thinking educator or they're not thinking, “Wow, that person has a bachelor's in environmental science and

biology.” So, I think it’s maybe more of an eye opening [when I explain what I do] like “Oh you teach programs, oh wow, okay.”

Carson, an aquarium educator, also described the lack of understanding of the job of an OE:

So, from the general public, you get asked if this is what you're doing while you're in college, even when you're in your 30s. I actually started doing my hair differently because it would show how much gray, [but people still say] ‘That's a not real job, it's not a grown-up job. It's a fun job you do for a while when you're young.’

Jordan also discussed that people generally do not know all the work and “all that goes into” being an OE. Carson and the other OEs are aware that the general public does not see what they do as a job in the traditional sense. When discussing their orientation to formal education, Cory recognized that outdoor learning is a part of a different system and educational paradigm, so it is not recognized as part of the formal education field. “It is so outside of our system and familiar structure.”

As opposed to the public perception, Carson described that formal educators often did recognize the complementary role that outdoor learning can have in the classroom, but that the formal education system is not set up to support it, “I think we got that a lot, the, ‘we [teachers] know this is valuable, but it doesn't fit what we're being told, what we have to be doing so we can't do it.’” However, Carson did recognize the persistent disassociation between outdoor learning and legitimate teaching:

There was all too often the well-meaning teacher who would be like, ‘You're so good, with kids you should be a real teacher,’ and I'd be like, ‘I don't want to be a classroom teacher, I am an educator and that’s okay.’

While people may not understand OEs as being a part of the educational ecosystem, there is a feeling that the content that they teach is appreciated and recognized as being valuable. Avery mentioned, “I have neighbors who thank me, ‘Thank you for educating our kids about this.’” Jose also discussed the relationships with the community, “I think the community as a whole does appreciate the function of an outdoor educator.” The OEs explained that the public understands that outdoor learning is important for students’ development, but it is still not accepted as being part of formal education, rather it is peripheral and still thought of as an add-on, not defined culturally as *education*. Carson explained that school systems “scheduled us as enrichment, not as content. Our programs were not considered instructional time.”

*Theme 14: Challenges to accomplishing professional goals*

During interviews, the OEs described their professional challenges that included a lack of credibility in formal education settings, policies addressing standards, weather, and time. Because state and national standards frequently drive the curricula for formal educators (Stevenson, 2007; Kubat, 2017), the OEs discussed the difficulty they had to gain access to students.

***Academic Challenges.*** The notion of credibility and legitimacy was a frustration for many of the OEs. Carson explained:

It was much harder for teachers to justify taking instructional time for something that wasn't technically content. They think there's still value to it, but it was not considered instructional time.

Avery also discussed the challenges teachers have when they try to incorporate outdoor learning into their classroom lessons:

They will catch flack. There is a teacher ...who was taking the kids in the garden a lot and the principal actually came out and asked her about it, and she said, 'oh no, we're reviewing EOG (End of Grade) standards *wink, wink*' and with that, the principal said, 'okay, I'll leave you alone then.' But they weren't [reviewing the EOGs]. They were planting something, I don't know. But yeah, she actually caught flack for taking the kids out.

Nicky explained that while although she and her coworkers are encouraged to design their lessons and utilize teachable moments, they must also be vigilant that, "the things that we do are 100% tied to the state standards, so within that innovation you're still thinking back towards the standards. So that opened the door and gave us the credibility."

Academic standards are a known structural feature in formal education of which OEs are well aware. While alignment with standards was critical for work with schools, none of the OEs described standards as a limitation, more as a known entity and even a framework for which OEs can tie into to support teachers. The challenges that were most often mentioned as true barriers to outdoor instruction were things like weather and seasonality that dictated what and when certain concepts could be taught and time limits. "There just never seems to be enough time in the day."  
(Nicky)

Some OEs described how the onset of the current COVID-19 pandemic may provide an opportunity to alter the perception of outdoor learning and alleviate some of the challenges. Cory was hopeful in saying, "I think that the outdoors is beginning to be seen as a legitimate learning space, COVID helped, we are at the cusp of it changing." However, Carson, had a more tentative prediction:

My optimistic prediction is that schools will realize we can do more stuff outside, let's take advantage of getting to do all the things we didn't get to do for the last year and a half, like go on field trips, go outside, get those outside of the classroom experiences. My pessimistic prediction is that it [COVID] will actually have almost no effect whatsoever. There are different ways to react to trauma and one of them is to ignore that it happened.

***Cultural Challenges.*** Three of the OEs expressed a challenge of OEs connecting with learners because of differing demographics between OEs and that of their program participants. Carson explained:

People who run this kind of programming, and who are in contact with schools are, on average, going to be people who grew up as White middle-class kids and how does that frame the experience of the students? Because in fact the average public-school student in the United States is not a White middle class kid.”

These OEs discussed the concern with the clear disproportionality in the racial, ethnic, and gender dynamics within outdoor education. Both White and non-White OEs discussed the need to acknowledge and address this for outdoor learning to truly be effective. Jose, a Latino agricultural extension agent, described the experience of being an OE of color:

It's just the 'good old boy' group of people, they will connect easier with an extensionist that is part of that team [White], so in that sense, because I'm not part of that team it's harder for me to connect because I am a Latino... It takes longer for me to gain the respect as a Latino person because they usually see a Latino as the field worker and how dare this Latino come to try to teach me something about how to manage my farm. This is a big barrier that I encounter and sometimes I was not able to break it, and that was the end of it.

Carson, an aquarium educator who works with public schools, described their struggle trying to address this cultural imbalance:

In the underpaid part time educator role, we [aquarium educators] were all people who had grown up as White middle-class kids. These are the kinds of people who would then end up doing something like aquarium programs, working with populations where a significant proportion of the kids are either themselves immigrants or their parents are [immigrants]...I mean there's also the entire endless and horribly racist history of access of Black and Brown people to beaches in the United States, we were really thinking about what...we're doing in a way that is respectful of who they are, and of what their experience has been.

### *Summary of Qualitative Results*

Interview data revealed patterns of the OEs' core identity formation that began with their outdoor experiences in early childhood. Each OE discussed their identities as OEs as laden with a sense of responsibility to be environmental stewards. The OEs described their goal as educators is to provide to their program participants the experiences that they remembered of freedom to explore natural spaces with respected adults. Additionally, the OEs also expressed a desire to support teachers in providing opportunities for their students' social and emotional growth through building similar connections with nature.

Many OEs described their role as a resource and a support system for formal educators, not a replacement or redundancy. They were clear that they do not wish to occupy the same ecological niche in the educational ecosystem as classroom teachers, but rather hoped to be a complement to students' formal education. The OEs have a deep respect for teachers and their ability to address students' cognitive needs. The OEs see their place in the system as one to

support this cognitive development and enhance students' affective development through building social emotional connections to the outdoors. OEs in this study have clear goals and a deep passion to empower people and help them understand that they are part of the natural world and have the power and responsibility to nurture and protect it.

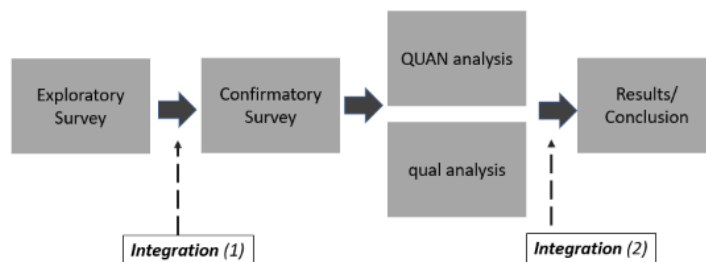
Throughout the interviews, the notions of responsibility, connection, inquiry-based pedagogies, and bridging the gap between indoor and outdoor learning were recurring themes. The OEs in this study who work with the formal school system expressed a collective desire to build connections between the informal outdoor and formal indoor classroom educational spheres. As Alex said, "I want to be a person that helps to be able to bridge that gap." In regard to the OEs' perceptions of challenges to their work, resources or money were not of primary concern. Foremost were issues such as the weather, location, and physical and cultural accessibility.

There was a deep awareness amongst the OEs of an underlying barrier of how homogenous and racially and ethnically disproportionate OEs are from the public. The majority of OEs are White and middle class while their constituents are not. This is an issue that was discussed by both White and non-White educators. The non-White educators felt that their biggest barrier to accomplishing their professional goals was "the color of my skin." The OEs in this study discussed that addressing the systemic root cause of this cultural barrier and lack of access is essential to move the profession forward, provide access for more people to become OEs, and to enable more students and the general public to experience the myriad benefits of outdoor education.

## **Data Integration**

One of the strengths of mixed methods research is that it provides an opportunity for a researcher to engage in purposeful data integration between the quantitative and qualitative data to present a complex view of the research and provide context, depth, and breadth to the findings (Guetterman et al., 2015). Through OEs' reports of their lived experiences, the qualitative data provide context and meaning to the quantitative measures while the quantitative data allows for generalizing the contextual experiences uncovered in the qualitative responses. This is particularly important in survey development when one is trying to understand the meaning and relevance of complex constructs (Creswell & Plano Clark, 2011). Additionally, comparing the results of the two data sources can serve as a method of triangulation to support the trustworthiness and validity of both datasets (Guetterman et al., 2015; Creswell & Plano Clark, 2011).

Data integration in a mixed methods study occurs at multiple points throughout the research process (Figure 5.19). In the present study, the first point of integration occurred during survey development between the exploratory (pilot) and confirmation surveys to check for convergence and content relevance. The second point of integration occurred during the data analysis to produce meta-inferences by utilizing the qualitative analysis to substantiate and illustrate the quantitative results of the survey (Ziegler, 2014).

**Figure 5.19***Data Integration Model*

Data integration (2) encompassed analysis of the interview responses in relation to the survey constructs to develop a more complete understanding of the phenomenon of OEs' positional identity within the educational ecosystem. Guetterman and colleagues (2015) recommend an effective way to interpret findings in a mixed methods study is through a joint display. The joint display is a matrix that illustrates both the quantitative and qualitative findings to enable data comparison between the two data types to generate inferences. This analysis-level integration begins by naming the construct(s) investigated, then the quantitative findings followed by a supporting qualitative quote, and finally the inference drawn from the two (Guetterman et al., 2015; Ziegler, 2014). Below is the joint display of the five constructs of OE identity within educational ecosystems that resulted from the exploratory factor analysis in the survey development followed by the quantitative data, qualitative data, and the inferences drawn from the integration of each dataset (Table 5.5)

**Table 5.5***Joint Display Integration of Quantitative and Qualitative Data*

| <b>Positional Identity</b> |  | <b>QUAN Findings</b> | <b>qual Findings</b>  | <b>Inferences Drawn</b>  |
|----------------------------|--|----------------------|---|--|
| Construct                  | Example Survey Item  | Mean score           | Interview quotes  | How qual explains QUAN   |
| Science Identity           | I spend my free time trying to find out more about science and science topics.   | 5.55                 | We [my family] liked the science, but that wasn't why we were there [the outdoors].   | Science is an interest but not an identity.                                      |
| Affective connection       | I feel a strong emotional connection with the natural world.                     | 6.55                 | The outdoors for me growing up meant fun, joy, relaxation...anytime I felt anxiety I went outside.  | Outdoors is a source of inner peace and emotional support.                       |
| Advocacy                   | Advocating for social justice is important to me.                                | 4.6                  | Advocate might be a little bit strong...but I will take up a cause for sure ...if something's unethical.  | Hesitance to identify as an advocate but identify strongly with social justice.  |
| Organizational position    | In most situations, I have the power to make my own decisions about programming. | 5.69                 | I had a really good relationship with coworkers and our directors of the program and the other educators. That's how I learned so much because they shared what they had. | Identify with coworkers and have autonomy within their organization.             |
| Professional Legitimacy    | Educators outside my profession see the outdoors as a legitimate learning space. | 5.1                  | That's a not real job, it's not a grown-up job. It's a fun job you do for a while when you're young.  | OEs' identity is not understood as a profession among the public (outside of OE) |

*Note.* Mean score is the composite score of each of the five constructs based on 7-point Likert scale (1 = Strongly disagree to 7 = Strongly

agree)

The contextual data reported in the qualitative analysis provided support and insight to the quantitative survey measures. During interviews, OEs described common themes of their own experiences connecting with nature that supported the development of their personal identities and influenced their professional and positional identities as OEs. The data integration of the quantitative and qualitative data is organized by each of the five constructs that were revealed in the SEM and together answer the research questions to present an illustration of OE identity within the educational ecosystem.

### **RQ1: How do outdoor educators' personal backgrounds influence their personal identities?**

#### ***Personal Identity Constructs***

The pairwise t-test revealed significant differences ( $p < .001$ ) among each of the personal identity categories. The quantitative results for the items on the affective connection items clustered around high levels of agreement and indicated lower levels of agreement on items regarding OEs' affiliation to science or as advocates. The quantitative results were supported by the OEs' responses during the qualitative interviews in which responses consistently included reflections on positive memories of emotionally connecting with nature and a hesitancy to discuss science identity and advocacy, each of which will be discussed below.

#### **Science Identity**

The science identity composite variable ( $M = 5.55$ ) received the second highest rating of the personal identity constructs on the seven-point Likert scale. Of the OEs interviewed, seven of the nine OEs expressed a resistance to the identity label of *scientist*, with the responses, "I taught science for forever, but I don't really [see myself as a scientist] and "we would learn something science-y because we had a question, but that wasn't why we were there." Findings from both

quantitative and qualitative data suggest that OEs in this study felt connections with science but indicate that it was not their primary professional identity. When asked to choose among the identity labels of *scientist*, *advocate*, or *nature person*, six of the nine chose nature person, two said a mix between scientist and nature person, and only one identified as an advocate. In general, the OEs in this study connected more closely with being a naturalist than as a scientist.

### **Affective Connection with Nature**

The affective dimensions yielded the highest level of agreement amongst the OEs ( $M = 6.55$ ). The quantitative data illustrates the affective orientation as the OEs more strongly agreed with the statements regarding their professional goals as being to support learners' growth and development ( $M = 6.7$ ) than their professional interest the logics of methods of scientific processes ( $M = 5.35$ ). The qualitative coding from the interviews provides further support for the strength of the affective connection with nature as part of OEs positional identity as all 21 of the statements coded within the "motivation" theme that emerged from the phenomenological reduction phase of the qualitative data analysis referenced joy and eliciting "Aha!" moments in others. All nine of the OEs explained their motivation to become educators with statements such as "Once I got into it and found the joy, that I could get sparks in a five-year-old when they try something new and they actually really like it" and "to get kids excited through learning more about the outdoors." It was "the enthusiasm, the focus, the interest, the joy." "I really derived a lot of energy from being outside, especially by myself." And "I always feel a little bit better when I am out in nature, and I want to share that with students."

### **Advocacy**

The OEs' responses to the advocacy items indicated the lowest level of agreement among the three constructs ( $M = 4.6$ ). This was supported with the qualitative data when the OEs were

asked to choose a label for themselves among *scientist*, *advocate*, or *nature person*. Only two of the nine discussed the notion of advocacy. One OE responded, “Advocate might be a little bit strong... but I will take up a cause for sure and it usually comes back around to if something's unethical.” Only one out of the nine OEs interviewed strongly identified with advocate as a personal identity label. However, both qualitative and quantitative datasets indicated that OEs identify with a strong sense of social justice and sense of civic and ecological responsibility. The quantitative data revealed that OEs agreed with the item regarding “*Advocating for social justice is important to me*” (M = 6.1) with significantly higher level of agreement than on the item, “*I participate in environmental advocacy activities such as demonstrations or marches*” (M = 4.2). The notion of social responsibility was supported with the qualitative interviews. Common responses to OEs’ goals of their professional actions were, “Getting to that next step of responsibility and stewardship” and “I just want to make sure that we [help students/participants] recognize that climate change is real, and we need to do everything in our power to take care of it.” and, “I want kids to learn to take care the planet...and each other.”

**RQ2: How do outdoor educators describe their pedagogical goals and positionality within their professional organization?**

***Organizational Position***

The construct of organizational position received the second highest agreement rating among all the constructs (M = 5.69). Among the items that measured how OEs felt their professional identity was respected and supported within their professional organizations such as, “*In most situation, I have the ability to make my own decisions.*” and “*My educational philosophy matches the mission of the organization in which I work.*” (M = 5.78), the OE reported consistent levels of agreement. In contrast, the item measuring access to profession

develop was ranked significantly lower “*I am encouraged to do as much professional development as I would like.*” ( $M = 5.25$ ). This discrepancy between their professional goals being valued and access to professional development was illustrated in the qualitative interviews. Seven of the nine OEs felt that they had supportive professional relationships among their coworkers and supervisors, “I had a really good relationship with coworkers and our directors of the program and the other educators. That's how I learned so much because they shared what they had.” However, they often faced dissent from HR and skewed public perceptions of outdoor learning, “We were constantly arguing for the professionalization of the educator role that it is not an entry level position that just anybody can pick up it, it has a professional background, it has theory and practice, it deserves professional development.”

Both the qualitative and quantitative data sources indicate the underlying perception of outdoor education not being seen as a substantial professional career warranting mandated professional development opportunities. Interestingly, four of five OEs interviewed who identified as male shared the frustration of not feeling professional recognition within their organization. Follow up interviews revealed that all four left their positions due to this frustration, while none of the four OEs who identified as female shared the same concern. The quantitative data did not reveal significant differences between male and female identity in their responses within this construct. This discrepancy warrants future investigation.

### **RQ3: How are outdoor educators' professional identities recognized?**

#### ***Professional Legitimacy***

The composite mean score in the professional legitimacy construct received the second lowest score ( $M = 5.1$ ) indicating that OEs only slightly agreed with these items measuring the perceived value of themselves as professionals within the educational ecosystem. Interestingly,

in the quantitative data, the item measuring the value of OEs' programs within the education system, "*Other educators see value in the programs that I lead*" had a higher mean score ( $M = 5.67$ ) than the items indicating the recognition of OEs identity as professionals by the public, "*I feel recognized as a professional by the general public*" ( $M = 4.16$ ) with a "very large" effect size ( $d = 1.17$ ) indicating a incongruity between the value of content and the professional recognition of the educator identity. The OEs also reported significantly higher levels of agreement on feeling recognized as professionals by other educators as indicated in the item, "*Formal Educators Respect as a Professional.*" ( $M = 5.25$ ) then being recognized as professionals by the public, "*I feel recognized as a professional by the general public*" ( $M = 4.16$ ).

These data were supported by the qualitative results in which in response to the question "What kind of responses do you get when you tell people you are an OE?" Logan described the publics' responses to their profession as, "What does that mean?" You do that for a living?" Jordan described the response to describing their work as a garden educator, "Oh that's cute, you know that's nice but that's not education." However, when discussing their relationship with classroom teachers, OEs reported experiencing higher levels of legitimacy. Avery explained, "Yeah, I'm kind of their go to and, all things outdoors they'll ask me questions, or like I said, I get more questions from the teacher sometimes than the kids. I think they know I'm there to support them." Carson described the disconnect between classroom teachers' value of outdoor learning and the broader public perception, "[teachers] know this [outdoor education] is valuable, but it doesn't fit what we are told to do."

The OEs discussed that they were often advocating for themselves to "legitimize" what they do. They used the word "credibility" often to describe their difficulty in integrating their

programs into formal education settings. Jesse, who had been a classroom teacher stated that they had an increased level of confidence due to past professional accomplishments, “I taught in the classroom for 21 years, I’ve got a masters.” Jose, an extension agent discussed the difference in approaching situations as a researcher or educator:

If I say I’m doing research on this, and I need this information, they are more open to share it than if I go to them and I say, I have a field day on this topic, can you give me some information? I think that there is definitely a difference when I approached it from the research perspective versus from the outdoor educator perspective.

Similarly, OEs discussed that even though formal educators valued the content, they did not recognize the programming as a potential component of the educational ecosystem. The OEs’ programs were, “Scheduled as enrichment, not as content. Our programs were not considered instructional time.”

When asked how they would classify their relationship with formal educators and were given the labels *colleague*, *collaborator*, *visitor*, or *mentor*, seven of the eight OEs who work primarily with formal schools classified themselves as being primarily visitors rather than it being a collaborator in a learning experience. Only when OEs explicitly identified for a school system that their programming connected directly to their science standards did they feel that they could achieve the perception of legitimate learning integration and a label of professional colleague, “That opened the door that that gave us the credibility.”

### ***Summary of Data Integration***

In both quantitative and qualitative data, OEs in the present study strongly identify on a socio-emotional level with being in the outdoors. The qualitative data indicate that the OEs attribute their personal identity to experiences they had in the outdoors as children and these

experiences influenced their choice to become OEs to support children's growth and development. Both datasets support the OEs' hesitancy to identify as either a scientist or an advocate. Additionally, the majority of the OEs in this study in both datasets expressed the challenges of achieving credibility with the broader public, but less so with formal educators, as being recognized as a legitimate component of educational ecosystem. Data also suggest an indication of varying experiences among gender identities which were not addressed in this study but could provide important insights.

## CHAPTER 6

### CONCLUSIONS AND IMPLICATIONS

Research in outdoor education suggests the need to provide a more nuanced understanding of outdoor education as a professional field and that OEs must make their aims and intentions clear if outdoor learning is to have a substantial impact be recognized in educational systems (Lugg, 1999; Nazir, 2016; Spiteri, 2020). To respond to this call, the present study explored the positional identity of OEs within the educational ecosystem to bring to the fore their unique contributions and begin to differentiate OE identity among the monolith of “environmentalists” identities to which they are currently relegated.

The results of this study indicate that OEs have a strong emotional connection to the natural world, complex identities, sense of responsibility, and a passion to collaborate with formal educators to support learners’ social emotional growth and development. They see their niche in the educational ecosystem as that of a collaborator to bridge the gap between the indoors and outdoors so all people can have the social emotional support of being outside in nature that they remember from their childhood as being a formative component of their personal core identity development.

#### **Connectedness with Nature and Outdoor Educator Identity**

Capaldi et al. (2014) and Beery & Lekies' (2021) research on ecological identity and prior work by Thomashow's (1996) and Clayton's (2003) on nature identities supports the notion of nature experiences contributing one's core identity development. Results from the quantitative survey data and the qualitative interviews with OEs in this study further indicate a nature-identity connection that suggests the extension of traditional identity theories such as Bronfenbrenner's ecological theory of psychological development to broaden the scope of the social systems that

form one's primary identity to include interactions with the natural world (Bronfenbrenner, 1977; Gee, 2000; Wenger, 2000). The shared ecological identity to which the OEs in this study associate defines "the kind of person" they are as someone whose identity stems from formative childhood memories in natural places (Beery & Lekies, 2021; Chawla, 2007; Gee, 2000; Thomashow, 1996). Research suggests that although this relationship may not be causal, there may be a critical period during childhood in which exposure to nature could affect biophilic beliefs, tendencies, and social-emotional development (Beery & Lekies, 2021; Capaldi et al., 2014; Orr, 1993).

The theme of the OEs' emotional association with nature was thread throughout both the quantitative and qualitative data. In the quantitative data the subconstruct to which the OEs most strongly agreed was the affective connection with nature ( $M = 6.55$ ). In the qualitative interviews, the OEs spoke most consistently about the "joy" and "peacefulness" they experienced in their childhoods in the outdoors and the desire to create opportunities for others to experience those "moments that I remember as a kid." The childhood memories in the outdoors and the cultural and familial value of nature experiences as restorative and joyful were paramount in the OEs' choice of pursuing outdoor education as professional career. Interestingly, although outdoor education is often associated with science education (Cho & Lee, 2018; Egger et al., 2017; Kubat, 2017), the OEs in this study seldom discussed *science* as their primary professional intention or identity and only "slightly agreed" ( $M = 5.55$ ) with the quantitative science identity survey measures.

Similarly, while previous research has suggested that time in nature in childhood can lead to a pro-environmental behaviors and are a precursor to environmental advocacy (Chawla, 2007; Tanner, 1980; Wells & Lekies, 2006), this study suggests that while the OEs did express a desire

to teach future generations to be environmentally responsible, the subconstruct of advocacy yielded the lowest rating among the personal identity composite categories ( $M = 4.6$ ). Time spent in nature was more associated with the OEs' affective development and core identity.

In several of the interview responses, the OEs repeatedly discussed their ecological identity as being “part of the ecosystem” and an emotional connection with nature originating from their time spent in natural outdoor environments. As several OEs stated, “It [being outside] is absolutely who I am.” Similarly, the interview responses of each of the nine OEs described a strong personal need to be in the outdoors. For example, Jordan explained, “I always feel a little bit better when I am out in nature.” Similarly, Nicky described, “there's a need in us to get outside.” The findings in this study align with the growing fields of biophilic and neuroscientific research associating human's co-evolution and innate need to affiliate with nature and healthy human development (Berto et al., 2018; Carson, 1965; Cho & Lee, 2018; Heerwagen & Hase, 2001, Kahn, 1997; Kellert & Wilson, 1993). The OEs described how their ecological identities and their connections with nature informed both their core identity development and their professional choices.

The qualitative and quantitative data presented in this study build off Avraamidou's (2014) and Moore's (2008) research on teacher identity and support the notion that investigating identity constructs of educators can be an effective analytical tool to understand their professional trajectories and pedagogical approaches. The qualitative interview responses describe OEs' memories of learning through exploring the outdoors as being influential in their choice to become *educators* so they can share these experiences with students. As Moore (2008) suggests, personal experiences, beliefs, and values influence what ones teaches, how they teach, and their development as educators.

## Outdoor Educators' Contributions to the Educational Ecosystem

### *Multiple Orientations*

The survey and interview data in this study revealed a complex multi-dimensionality of OE identities. When given labels of *scientist*, *nature person*, or *advocate* and asked to which the OEs identified, the OEs in this study hesitated to choose an individual label. Each ascribed to aspects of each category to varying degrees but did not identify fully with any one of the categories. These findings parallel Payne's (2001) and Fuentes Amaya's (2004) argument that OEs are not a monolithic entity and there is not one single, unidimensional orientation to their pedagogical practices. OEs contribute an array of perspectives and developmental opportunities for students and participants in their programs to experience. Relegating their positional identity in the educational ecosystem to one single unidimensional orientation would limit the scope and recognition of their contributions.

Each of the OEs in this study described their unique voices and approaches to support students' growth and development. Jose described the interest in sharing knowledge of farming "to better their [program participants] income, their lives." Quinn discussed connecting students to nature through martial arts and dance, "I just love watching them become better martial artists and dancers while learning about animals." And Jessie described that the aim of teaching in the outdoors is to offer students "a little peace and joy." Avery expressed resistance to being classified into only one educational category and described that teaching in the outdoors spans across the curriculum, "I mostly teach skills that they need to be successful in [both] traditional and non-traditional schools."

### *Supporting Whole Child Learning*

The survey data revealed that the OEs' positional identity in the educational ecosystem was primarily characterized by their motivations to promote healthy social and emotional development for students. When discussing the goals of outdoor education Jordan explained, "I think they [the students] will be able to make better informed decisions about whatever may come up in their life."

The intention to include both cognitive and affective education complements the recommendation of the CDC and the Association of Supervision and Curriculum Development (ASCD) of the whole child coordinated school health (CSH) approach developed by Allensworth & Kolbe (1987) that suggests that the physical and emotional health are essential components to classroom learning and child development (Lewallen et al., 2015). Outdoor learning experiences have potential to support socio-emotional dimensions in education by providing moments of "reflection" and "joy" through connecting with the natural community. As Jordan described it, "I think a lot of people underestimate all that goes into raising a child and making sure that they're nourished, mind and body." These affective-cognitive connections echo Nel Noddings' (2005b, 2005a) work on educating the whole child and the importance of developing communities of caring to meet the expressed emotional needs of students for effective classroom learning.

In their discussion of theories of teaching and learning, Bransford et al. (2005) assert that effective pedagogy and brain development is dependent on emotional safety, experience, and the local environment. Rich environments that include numerous opportunities for social connections, direct physical contact with and exploration of the environment are necessary for authentic learning to occur. They suggest that holistic multi-dimensional learning should

complement the standards and pacing guides to which teachers are bound and aid in transferability of classroom learning, not be viewed as a disruption to it.

The results of both the survey and the interviews demonstrate that the goal of the OEs is analogous to that of the CDC and ASCD whole child learning model. A positive social and emotional school climate is necessary for effective teaching and learning (Lewallen et al., 2015). Darling-Hammond and Cook-Harvey (2018) further discuss the importance of whole child learning that support students' social and emotional skills and development of healthy habits they will use in school and throughout their lives. The OEs in this study shared similar goals. As Carson explained, "I want more kids to have the experience of feeling safe in the woods, of knowing how to climb a tree, that expansiveness." Jordan described the goal of, "building those life skills that they can take with them for the rest of their lives." Avery explained that outdoor learning is, "teaching life skills... I mostly teach skills that they need to be successful."

Given the known physical and mental health benefits of exposure to the outdoors well cited in the literature, and the rich professional and pedagogical contributions of OEs that the present study reveals, OEs should be included as essential stakeholders among the education and health professions in the student's developmental ecosystem. To achieve this, OEs must first be culturally recognized, and their voices heard so they can be valued for the knowledge, education, skills, and resources they contribute.

### **Lack of Recognition of Outdoor Educators' Identity**

Lugg (1999) discusses that the paucity of effective research contributes to the disassociation of outdoor learning from the rest of the educational ecosystem. Spiteri (2020) proposes the need to change the perception that the indoors is the only proper place for learning and to reimagine the pedagogical potential of outdoor learning.

Results in the present study support this assertion. Both quantitative and qualitative data reveal the lack of recognition of OE as a profession by the public. Carson, an aquarium educator, explained how this public perception trickles down to teachers and affects the OEs' ability to contribute to student learning, "they [teachers] know it's valuable, but it doesn't fit [into their curriculum]." Avery described that teachers "catch flack by the principal" when they try to implement outdoor education in their lessons.

The lack of recognition of the outdoors as a legitimate learning space limits students' access to the benefits of the pedagogy and affordances available in outdoor settings. Outdoor learning is uniquely situated to provide physiological benefits of decreased stress (Berman et al., 2008; Kaplan, 1999), has been shown to increase connectedness and feeling of happiness (Capaldi et al., 2014) increased immune functioning and attention, and activates multiple neural pathways (Kuo, 2015; Sobko et al., 2020). For the OEs in this study, supporting others to have the opportunity to spend time in the outdoors and reap the benefits of nature is their primary professional goal. In interviews, when asked, "What's your main goal as an educator?" A common response was, "I want people to have joy in the outdoors and find something they can connect to and want to keep coming back."

The OEs in this study described how the education system in the U.S. does not recognize them as "legitimate" educators. OEs indicated low levels of agreement on the survey items measuring professional legitimacy ( $M = 4.9$ ). The OEs in the qualitative interviews often discussed their awareness that they "do not speak the same language as formal educators." They acknowledged the disconnect between indoor and outdoor education and discussed their desire for their positional identities to be recognized as a resource and bridge this gap by building connections and collaborations with other educational institutions. Alex described how this

collaboration could support students' learning and socio-emotional development, "I think collectively there's a lot of work that could get done if that gap is bridged a little bit better."

### **Bridging the Gap Between Formal (indoor) and Outdoor Education**

The intention of the present study is to begin to bridge the gap of recognition of OEs' positional identity within the educational ecosystem through initiating discourse between the formal indoor and outdoor educational spheres. The OEs in the qualitative interviews recognize the conceptual gap between themselves and formal educators. Alex explained, "they understand that this [outdoor] education is coming from a different background and a different place." Cory further described the notion that outdoor education is "a different system, not recognized as an education field because it is so outside of our traditional system and structure of education."

Survey findings affirmed this notion and revealed that OEs indicated slight agreement ( $M = 5.3$ ) with feeling recognized by formal educators as professionals. Four of the nine OEs interviewed described that they feel that they are an untapped resource and want to start building the bridge between formal indoor and in/nonformal outdoor educational spheres. Alex explained, "I want to be the person that helps to be able to bridge that gap... I guess I view myself as a resource that they can use [to support their students]." The OEs in this study shared their common intentions with formal educators to support student learning. Creating the discourse between formal educators and OEs to recognize these common goals could address this conceptual gap and support OEs recognition as an important complementary component in the educational ecosystem.

When working with schools, many of the OEs perceive their job as inspiring students to care and emotionally connect with the content and support the teachers' curricula. Branford et al. (2005) and Falk and Dierking (2010) suggest that significant amounts of learning happen outside

of school and this learning contributes to students' classroom experiences. The OEs in this study discussed their interest to build partnerships with classroom teachers to support this need for extracurricular connections. Jorden explained, "there's always something that we could tie into the classroom."

The OEs recognize the challenges of formal teaching and discussed a deep respect for classroom teachers' skills, classroom management strategies, and their extensive pedagogical knowledge. The OEs in this study shared their goals to support and reinforce classroom learning by addressing the affective dimensions of cognitive development and concept integration for which formal teachers are seldom allocated time or resources. Logan expressed a strong interest in supporting this holistic learning and teaching, "so that we can push this agenda further of adding more environmental education into the curriculum beyond science."

### **Support for the Outdoor Educator Community**

*Reinforcing Career Awareness.* A surprising finding of the present study was the lack of awareness among OEs of their collective positional identity. During the member checking phase of the phenomenological analysis, several of the OEs indicated a lack of connection among OEs themselves, "I found it very rewarding to read the other perspectives and know I'm not alone. Maybe there are enough of us to actually make a meaningful difference as we all seem to want to." Another OE commented, "I want to meet all these other great people you interviewed." The OEs individually shared very similar ecological identities and goals to contribute a positive environmentally responsible future yet are unaware of their common intention. One implication of the present study could be to unify their voices and put OEs on each other's conceptual radar to support each other, legitimize their positional identities as collective force, and reinforce their common goal of supporting learners and "making something [a difference] that lasts."

***Recognition of Outdoor Educators Within the Educational Ecosystem.*** Data from the present study provide a space for these seldom heard voices to be recognized and understood as a valuable, and arguably necessary, component for healthy, whole child learning and development. The demographic data from the quantitative survey challenges the common cultural perception of outdoor education as unskilled temporary work that is “not a grown-up job” and, “it’s a fun job you do for a while when you’re young.” Ninety percent of OEs have a university degree or higher and close to 75% have persisted in the field for six years or more. The OEs in this study think deeply about their impact on child development and make very deliberate choices to contribute to whole child learning. They are well read on educational theory and eager to be part of the effort to support teachers and students both socio-emotionally and academically.

Perhaps by providing data that illustrate OEs’ personal and professional identities to the broader community, within and beyond the educational ecosystem, OEs high level of training, dedication, and commitment to learning can be better utilized. If OEs are considered as part of the legitimate framework for student learning, they can more effectively contribute to learning in subject areas throughout the curriculum. Integrating outdoor education into the formal curricula could also support the *Framework for K-12 Science Education* (NRC, 2012) to ensure that all students have working knowledge of science and engineering practices and are able to contribute to public discussions and can make positive healthy choices, be critical thinkers, and have experiences outside of the school building that can produce socially and ecologically literate citizens.

### **Contributions and Future Directions**

The results of the present study challenge the perception of OE peripheral professional identity by revealing insight into the pedagogy and professional practices of OEs within the

educational ecosystem. Additionally, the development of a new validated survey instrument to investigate OE identity addresses the need for a “systematic and rigorous approach to understanding the process and outcomes of outdoor education” (Leather, 2001; Lugg, 1999; Nazir, 2016; Neill, 1997, p. 193; Spiteri, 2020). The information obtained from the initial model development within the SEM and the phenomenological study uncover important implications for future research on OE positional identity to support the effort to legitimize OEs’ positional identity including continued model development to refine the measures, further investigation into the demographic data, and strengthening connections between formal teachers and OEs.

### ***Model Refinement***

The survey instrument developed in this study to analyze OEs positional identities indicated a good model fit within the SEM and that it is a valid measure of OE identity. Analysis of the quantitative results supported by the qualitative data from the phenomenological study informed additional modifications of the current instrument to make it an even more robust measure. An exploration of alternate statistical models within the SEM indicate that simplifying the model to focus on the three personal identity constructs (science identity, affective connections with nature, and advocacy) and adjusting the professional legitimacy construct to better reflect OEs’ view of their integration into the educational ecosystem would optimize the efficacy of the instrument and provide a deeper understanding of OEs identity and contributions to educational ecosystems. The results of a preliminary simplified model presented an excellent model fit (CFI of .967, TFL= .955) and indicates the value of future exploration. Refining the science identity scale to investigate OEs’ definition of *scientist* as an identity construct, clarifying the specific outdoor pedagogy that elicits the socio-emotional support that appeared to be an important professional goal of the OEs, and further exploring OEs intentionality to

collaborate with formal educators could yield valuable information into OEs identity and positionality.

### ***Investigation of Demographic Data***

This study has also provided insight into the lack of representation of OEs in regard to racial and ethnic groups and indications of potential implications of gender identity within the professional field of outdoor education. While not the focus of the present study, intentional investigation of the demographic components of OE identity appears to be warranted. Data collected in the present study did not allow for robust statistical analysis due to lack of representation of non-White and non-binary OE participants; however, follow up interviews with the OEs did reveal that non-White OEs felt their race and ethnicity was a significant barrier to their OE identity and male presenting OEs indicated that the female dominated profession coupled with the challenges of professional legitimacy was a barrier to their identity in the field of outdoor education. Further research could help to recognize and address these cultural inequities to begin to alleviate these barriers for OE professionals. Future work is needed to address the influence of these demographics on access to the outdoors and the opportunity to affiliate with nature which has shown to provide connections to nature that inform one's development, positional identity, and professional trajectory.

### ***Action Research: Connecting Outdoor Educators and Formal (indoor) Educators***

Future work could also include an action research approach to initiate the integration of outdoor learning into whole child community health models. Connecting OEs with formal educators could build a collaborative learning model to address the discursive barriers and bridge the conceptual gap between the spheres of knowledge. A collaborative action research project could help define a structured procedure and processes to establish a common understanding

between formal educators and OEs. As a result, future educational policy actions could be adjusted and adapted to include connection to outdoor environments and provide a place at the table for OEs to contribute their knowledge and skills. Creating a sustainable, organized environment for discourse among policy makers, formal educators, and OE is necessary if we are to achieve the learning and health outcomes that research has shown to be essential for healthy child development (Collins et al., 2020; Darling-Hammond & Cook-Harvey, 2018; Lewallen et al., 2015).

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**APPENDICES**

**APPENDIX A**

## Request Letter to NC for Exploratory Survey

Subject: Your Help Needed: Evaluating the Role of Outdoor Educators in Broader Educational Contexts (NCSU Research, 15 min Survey)

Dear Educators,

I am a doctoral student at NC State University studying science education with a focus on outdoor learning. I am developing a research tool to aid education researchers in better understanding all the contributions and perspectives that outdoor educators bring to educational contexts. As part of the development and validation of this instrument I am looking for ~200 outdoor environmental educators to take this survey:  
[https://ncsu.qualtrics.com/jfe/form/SV\\_7a0h08snKixeDoW](https://ncsu.qualtrics.com/jfe/form/SV_7a0h08snKixeDoW)

It only takes about 15 minutes, and your input is so important to make researchers aware of all the important things that you all bring to learning environments. As a thank you for your time and help, if you complete the survey, you will be eligible to participate in a drawing for a \$50 gift card.

Thank you so much for your help! Please contact me if you have any questions.  
Aimee  
[abfraulo@ncsu.edu](mailto:abfraulo@ncsu.edu)

## APPENDIX B

### Social Media Outdoor Educator Participant Message

#### *Facebook:*

If you are an environmental educator teacher who teaches in the outdoors, please consider completing this brief survey to help educational researchers better understand all the contributions and perspectives that outdoor educators bring to educational spaces. It will only take a few minutes!

There are minimal risks and no direct benefits from participating in this research and your responses will not be connected with your identity or place of work.

Please click the link below to open the research consent form which will begin the survey questions. I appreciate your valuable time and consideration of this request.

If you know any other environmental educators who would be interested, please share this survey with them. If you have any questions, please contact us!

**Link to consent form and survey questions:** [insert link here]

#### *Twitter:*

1/2: If you are an environmental educator teacher who teaches in the outdoors, please consider completing this brief survey to help educational researchers better understand all the contributions and perspectives that outdoor educators bring to educational spaces. It will only take a few minutes!

**Survey & Consent:** [insert survey link]

2/2: Minimal risks, no direct benefits, responses not connected to your identity/place of work.

If you know any other environmental educators who would be interested, please share this survey with them. If you have any questions, please contact us!

**APPENDIX C**

## Final Letter of Request for Exploratory Survey

Dear Educators,

I am writing to you to ask for your help to validate a research instrument I am developing to aid education researchers to understand the perspectives and contributions that outdoor educators bring to educational spaces. The survey (link below) only takes 10-15 minutes to complete. Thank you so much to all of you who have already contributed. Your input is so valuable!  
[https://ncsu.qualtrics.com/jfe/form/SV\\_7a0h08snKixeDoW](https://ncsu.qualtrics.com/jfe/form/SV_7a0h08snKixeDoW)

For those of you who have not contributed yet, the survey will close at 5:00 pm on August 11!

As a thank you for your time and help, when you submit a completed the survey, you will be entered into a drawing for a \$50 gift card.

Please contact me if you have any questions,

Thank you!

Aimee  
[abfraulo@ncsu.edu](mailto:abfraulo@ncsu.edu)

**APPENDIX D**

## Likert Scale Survey Items for Exploratory Survey

1. Others seeing me as an educator is important to me.
2. I identify with members of the teaching profession.
3. Social justice is important to me.
4. Humans' connection to the natural world is important to me.
5. I see myself as a scientist.
6. Outdoor education is about humans' history with the natural world.
7. I see myself as an environmental advocate.
8. Being in the outdoors inspires a sense of awe and wonder.
9. Developing emotional connections to natural world is important to me.
10. My personal interest in the outdoors is participating in physical adventure activities.
11. I enjoy engaging in scientific exploration in the outdoors.
12. I feel proud to tell people that I am an outdoor educator.
13. I strive to provide meaningful educational experiences.
14. My professional qualifications are valued by the organization in which I work.
15. I make my own decisions about programming.
16. I feel that I am well compensated for my work.
17. I feel that my professional goals match those of the educational organization with which I work.
18. I am respected by my supervisor for what I do.
19. The steps that I must take to advance my career are clear and accessible.
20. I like what I do in my job.
21. My professional identity as an outdoor educator is valued by the general public.
22. I feel that my work is appreciated by others in the outdoor education community.
23. My personal beliefs and values align with my professional role as an outdoor educator.
24. Educators not in the outdoor education field see a value in the programs that I lead.
25. Formal educators view me as having equal professional status.
26. Educators outside of my profession do not appreciate my work.
27. I share similar learning/teaching goals with the external organizations with which I work.
28. When I present programming to organizations such as schools or clubs, I feel that there are barriers to successfully accomplishing my professional goals.
29. My work is recognized as being part of the education profession.
30. I feel comfortable interacting with other education professionals.
31. I feel like the teachers and I are effective partners on the same team.
32. My goals are to work with teachers to optimize student learning.
33. My goal is to have a collaborative relationship with classroom teachers.
34. I feel that the classroom teachers are engaged with the content and the students during my lessons.
35. Classroom teachers value my contributions to student learning.
36. Complying with the school policies puts limitations on how I can teach.

37. I have a collaborative relationship with the schools and organizations with which I work.

### Demographics

What is your age?

- 18-25
- 26-35
- 36-45
- 46-55
- >55

With what gender do you identify?

- Male
- Female
- Non-binary
- Other
- Prefer not to say"

In what region of the U.S. do you currently work?

- Northeast
- Southeast
- Midwest
- West
- Southwest
- Outside the contiguous 48 states or a U.S. territory

The type of organization I work for is classified as:

- Non-profit
- For profit
- Government
- School
- University

My professional organization is a:

- Nature center
- Arboretum
- Out of school program
- Forest or Park Service
- Museum
- Zoo or Aquarium
- School
- Community organization
- Garden
- Other

What is the highest educational level of education you have attained?

- High school
- College
- Graduate degree
- Non-degree certification programs

With what race/ethnicity do you identify?

- White
- Black/African American
- Latin American
- Native American
- Asian/Pacific Islander
- Multiple
- Other

For how many years have you been an outdoor educator?

- 0-2
- 2-5
- 5-10
- >10

Thank you for helping us with this survey validation! If you would like to be entered into the \$50 gift card drawing, please click on the link below.

**APPENDIX E**

## Request to Post Confirmatory Survey on EE Listservs

Dear (contact at institution),

My name is Aimee. I am a doctoral candidate at North Carolina State University. As part of my dissertation work, I am developing a research instrument to aid education researchers to better understand all the contributions and perspectives that outdoor educators bring to educational contexts. As part of the development and validation of this instrument I am looking for outdoor environmental educators to take a short survey I have created. The survey takes less than 10 minutes to complete. Hearing the input and voices of outdoor educators is so important to make researchers aware of all the important things that you all bring to learning environments.

Could I please ask for your help in distributing the survey(link attached) by sharing it on the \_\_\_\_\_ listserv or mailings? If you have any other ideas or suggestions, I would greatly appreciate your thoughts and input!

[https://ncsu.qualtrics.com/jfe/form/SV\\_cOUbA2CHySKy0Jw](https://ncsu.qualtrics.com/jfe/form/SV_cOUbA2CHySKy0Jw)

The survey takes about 7 minutes to complete. Please contact me if you have any questions or comments. I would love to hear your thoughts and perspectives.

Thank you so much. I look forward to hearing from you.

Take care,  
Aimee  
[abfraulo@ncsu.edu](mailto:abfraulo@ncsu.edu)

## APPENDIX F

### Survey Participant Consent Form

#### Screening Questions

Are you 18 years old or older?  
Do you live and work in the United States?  
Are you an outdoor environmental educator?

[If participants say “No” to one or more of the following questions, they will not see the consent and the researcher will discard their screening questions.]

#### Survey Consent

You are being asked to complete a survey for research purposes. Participating in this survey will help us to develop and validate a research instrument to provide information for the education research community to gain a greater understanding of all the contributions outdoor environmental educators bring to learners in educational spaces.

Completing this survey is voluntary and you can stop at any time by closing your browser or by contacting the researcher and asking to be removed from the study. The researcher will delete your survey response wherever possible.

You must be 18 years of age or older, reside in the United States, and have outdoor instruction included to some degree in your job to participate in this study.

There are minimal risks associated with your participation in this survey. If you submit a complete survey and provide your email address, you will be entered into a drawing for a \$50 gift card. If you are interested in being entered in the drawing, please click on the link at the bottom of the survey. You will be linked to a second survey that will collect your email address twice. If you submit a survey but do not provide an email address, you won't be entered into the gift card drawing.

If you have any questions about the survey itself, how it is implemented, or survey compensation, please contact the student researcher, Aimee Fraulo, at 863-464-1069 and [abfraulo@ncsu.edu](mailto:abfraulo@ncsu.edu). You can also contact the faculty advisor for the protocol, Dr. Sarah Carrier, at 919-559-8180 and [sarah\\_carrier@ncsu.edu](mailto:sarah_carrier@ncsu.edu). Please reference study number 24091 when contacting anyone about this project.

If you have questions about your rights as a participant or are concerned with your treatment throughout the research process, please contact the NC State University IRB Director at [IRB-Director@ncsu.edu](mailto:IRB-Director@ncsu.edu), 919-515-8754, or [fill out this confidential form online](#).

If you consent to complete this survey, please click the link to access the survey and click “Yes I consent” button to see the survey.

## APPENDIX G

### Interview Protocol

Thank you for agreeing to participate in this study. The purpose of this study is to gain a better understanding of outdoor educators and their work and views of their professional and institutional identities. Your answers will be confidential. I will use pseudonyms on all notes and reports. Is it okay if I audio record this interview? If you want to stop at any time or stop recording at any time, just let me know. Because this conversation will be recorded, I encourage you to speak from your own experience and not use the names of other people. If you want to mention someone else in your response, instead of using their name, refer to them by the role they play in your life, e.g., “colleague,” “supervisor,” “student,” “school,” etc. Do you have any questions before we begin?

1. Tell me a bit about your background: your experiences growing up, your education, your experiences with the outdoors?
  - a. Who are people in your life who have been the most influential for you and contributed to who are and how you see yourself?
  - b. Can you tell me about a formative event that was influential for you?
2. How does your world view connect to your orientation to the outdoors?
3. How do think other people would describe you (e.g., nature person, scientist, advocate...)?
4. How did your background influence your decision to become an outdoor educator?
  - a. What motivated you to become an outdoor educator?
5. How would you define your role as an outdoor educator?
  - a. What is your main goal as an outdoor educator?
6. What is your current position?
  - a. For how long have you had that position?
  - b. How much autonomy do you have to make decisions about your programing?
  - c. Tell me about your professional experiences with coworkers and supervisors.
7. What kind of responses do you get when you tell people that you are an outdoor educator?
  - a. by other educators

- b. people in the community
8. How do you feel that your outdoor education program aligns with formal education?
  9. Do you feel that there are barriers to accomplishing your professional goals? With schools? The public? If so, what are they?
  10. How do you see your relationship with formal educators?
    - Colleague
    - Collaborator
    - Visitor
    - Mentor
- a. How do you think formal educators view their relationship with you as an outdoor educator?

*The interview will follow a semi-structured approach. The researcher will ask the above questions in an order seen as appropriate. The researcher may also ask additional probing questions to develop a deeper or more clear understanding of the participant's perspective, such as, "Can you please tell me more about that?" or, "Can you clarify what you mean by that?"*

## APPENDIX H

### Consent Form

**Title of Study:** Exploring Outdoor Educators' Positional Identity in Educational Spaces  
(eIRB # 24091)

**Principal Investigator(s):** Aimee Fraulo, 863-464-1069, [abfraulo@ncsu.edu](mailto:abfraulo@ncsu.edu)

**Funding Source:** None

**Faculty Point of Contact:** Dr. Sarah Carrier, 919-513-2808, [sarah\\_carrier@ncsu.edu](mailto:sarah_carrier@ncsu.edu)

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#### **What are some general things you should know about research studies?**

You are invited to take part in a research study. Your participation in this study is voluntary. You have the right to be a part of this study, to choose not to participate, and to stop participating at any time without penalty. The purpose of this research study is to gain a better understanding of outdoor educators and their work. We are requesting your participation in an audio recorded interview.

You are not guaranteed any personal benefits from being in this study. Research studies also may pose risks to those who participate. You may want to participate in this research because it will enable the education community to develop an understanding of outdoor educators' views of their professional and institutional identities. You may not want to participate in this research because you are not willing or able to commit to the time necessary for the interview.

Specific details about the research in which you are invited to participate are contained below. If you do not understand something in this form, please ask the researcher for clarification or more information. A copy of this consent form will be provided to you via email. If, at any time, you have questions about your participation in this research, do not hesitate to contact the researcher(s) named above or the NC State IRB office. The IRB office's contact information is listed in the *What if you have questions about your rights as a research participant?* section of this form.

#### **What is the purpose of this study?**

The purpose of the study is to learn more about outdoor educators, their motivations, and their views of their professional and institutional identities.

#### **Am I eligible to be a participant in this study?**

There will be approximately 5-10 participants in this study who will be invited to do an audio recorded interview.

In order to be a participant in this study, you must agree to be in the study and be an adult (over 18 years of age), and a practicing environmental educator who lives and teaches in outdoor settings in the United States. There is no requirement or expectation

that you participate in the study due to prior professional or personal experience with the researcher. You cannot participate in this study if you do not meet the inclusion criteria or, if selected for an interview, do not agree to be recorded.

### **What will happen if you take part in the study?**

If you agree to participate in this study, you will be asked to do all of the following:

1. If you indicated that you want to do an interview, we will ask you to choose a time that is convenient for you to be interviewed and will follow-up via email to confirm and remind you of your interview date and time.
2. We will meet over Zoom audio conferencing or by phone for an hour where we will ask you open-ended questions about your experiences in outdoor education. This conversation will be audio recorded.
3. Agree to participate in a follow up online or phone interview where we will ask you to check your interview transcript for accuracy.

The total amount of time that you will be participating in this study is 2 hours.

### **Recording and images**

If you want to participate in this research, you must agree to be audio recorded. If you do not agree to be audio recorded or video recorded, you cannot participate in this research.

### **Risks and benefits**

There are minimal risks associated with participation in this research. The main risk to you is that someone might be able to re-identify you if they had access to Google or they had access to your complete interview transcript. The researchers will implement a data security plan designed to keep these data safely secure and only plan on publishing data in aggregate or quotes without your name. Gender neutral pseudonyms will be used to address privacy concerns.

There are no direct benefits to your participation in the research. The indirect benefits would be to contribute to the education research community information about outdoor educators and their professional and institutional identities.

### **Right to withdraw your participation**

You can stop participating in this study at any time for any reason. In order to stop your participation, please contact the student researcher, Aimee Fraulo, at [abfraulo@ncsu.edu](mailto:abfraulo@ncsu.edu) and 863-464-1069. You can also contact the faculty advisor for this research, Dr. Sarah Carrier, at [sarah\\_carrier@ncsu.edu](mailto:sarah_carrier@ncsu.edu) or 919-513-2808. If you choose to withdraw your consent and to stop participating in this research, you can expect that the researcher(s) will redact your data from their data set, securely destroy your data, and prevent future uses of your data for research purposes wherever possible. This is possible in some, but not all, cases.

**Confidentiality, personal privacy, and data management**

Trust is the foundation of the participant/researcher relationship. Much of that principle of trust is tied to keeping your information private and in the manner that I have described to you in this form. The information that you share with me will be held in confidence to the fullest extent allowed by law.

Protecting your privacy as related to this research is of utmost importance to me. There are very rare circumstances related to confidentiality where I may have to share information about you. Your information collected in this research study could be reviewed by representatives of the University, research sponsors, or government agencies (for example, the FDA) for purposes such as quality control or safety.

How I manage, protect, and share your data are the principal ways that I protect your personal privacy. Data that will be shared with others about you will be re-identifiable.

**Re-identifiable.** Re-identifiable data is information that I can identify you indirectly because of my access to information, role, skills, combination of information, and/or use of technology. This may also mean that in published reports others could identify you from what is reported, for example, if a story you tell me is very specific. If your data is re-identifiable, I will report it in such a way that you are not directly identified in reports. Based on how we need to share the data, I cannot remove details from the report that would protect your identity from ever being figured out. This means that others may be able to re-identify from the information reported from this research.

**Future use of your research data**

Your information, even with identifiers removed, will not be stored or distributed for future research studies.

**Compensation**

For your participation in this study, you will receive no compensation.

**What if you have questions about this study?**

If you have questions at any time about the study itself or the procedures implemented in this study, you may contact the contact the student researcher, Aimee Fraulo, at [abfraulo@ncsu.edu](mailto:abfraulo@ncsu.edu) and 863-464-1069. You can also contact the faculty advisor for this research, Dr. Sarah Carrier, at [sarah\\_carrier@ncsu.edu](mailto:sarah_carrier@ncsu.edu) or 919-513-2808.

**What if you have questions about your rights as a research participant?**

If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated during the course of this project, you may contact the NC State IRB (Institutional Review Board) office. An IRB office helps participants if they have any issues regarding research activities. You can contact the NC State University IRB Director at [IRB-Director@ncsu.edu](mailto:IRB-Director@ncsu.edu), 919-515-8754, or [fill out this confidential form online](#).

**Consent To Participate**

By signing this consent form, I am affirming that I have read and understand the above information. All of the questions that I had about this research have been answered. I have chosen to participate in this study with the understanding that I may stop participating at any time without penalty or loss of benefits to which I am otherwise entitled. I am aware that I may revoke my consent at any time.

**Yes, I consent to participating in this research study**

Name \_\_\_\_\_

Today's Date \_\_\_\_\_

**No, I do not consent to participating in this research study.**

**Thank you for your consideration.**

**Interview scheduling message post-consent on Qualtrics**

Thank you for agreeing to participate in a semi-structured, audio recorded interview with me over the phone or Zoom for research purposes.

**What type of interview do you prefer?** Please select one:

1. Phone interview  
*If this option is chosen, box asks for and collects their phone number*
2. Zoom interview  
*If this option is chosen, box asks for and collects their email address*

**Please list at least 5 dates and times below that work for you to do an interview with me.**

<insert option 1: Day and Time>

<insert option 2: Day and Time>

<insert option 3: Day and Time>

<insert option 4: Day and Time>

<insert option 5: Day and Time>

**How would you like for me to confirm your interview date and time?**

1. By phone  
*If this option is chosen, box asks for and collects their phone number*
2. By email  
*If this option is chosen, box asks for and collects their email address*

**I will respond with an email confirming your interview date and time as well as providing information about the web-conferencing platform or phone call details that I will use for your interview.**

**Thank you,**

Aimee Fraulo

## APPENDIX I

### Revised Survey Items for Confirmatory Survey

1. When I am in the outdoors, I often engage in or think about scientific processes
2. I feel the most comfortable when I am outside connecting with the natural world.
3. I feel a strong attachment to scientific fields
4. Being in the outdoors inspires a sense of awe and wonder.
5. I see myself primarily as a scientist
6. Advocating for social justice is important to me.
7. I feel a strong connection to the natural world.
8. I participate in environmental advocacy activities such as demonstrations or marches.
9. I spend my free time trying to find out more about science and science topics
10. My main professional goal is to teach people to protect and be stewards of the environment.
11. It is more important to me to have participants leave my programs with positive feelings about the environment than with specific scientific knowledge.
12. I am the person who my friends and family go to when they have questions about science and nature.
13. Other people see me as a “nature person”.
14. People often label me as an activist.
15. The work of an outdoor educator is important for learners’ growth and development.
16. I see myself as an environmental educator, not a science educator.
17. I feel that my educational philosophy matches the mission of the organization with which I work.
18. In most situations, I have the power to make my own decisions about programming.
19. I am respected by my supervisor(s) for what I do.
20. I am encouraged to do as much professional development as I would like.
21. Educators not in the field of outdoor education see a value in the programs that I lead.
22. Formal educators look up to me (in my role as an outdoor educator) as a source of knowledge.
23. Educators outside my profession see the outdoors as a legitimate learning space.
24. My profession is recognized as being part of the education profession by the general public.
25. Formal educators respect me as a professional (in my role as an educator)

### Demographics

What is your age?

- 18-25
- 26-35
- 36-45
- 46-55

- >55

With what gender do you identify?

- Female
- Male
- Non-binary
- Other
- Prefer not to say

In what region of the U.S. do you currently work?

- Northeast
- Southeast
- Midwest
- West
- Southwest
- Outside the contiguous 48 states or a U.S. territory

The type of organization I work for is classified as: \_\_\_\_\_

What is the highest educational level of education you have attained?

- High school
- 2-year college
- 4-year college
  
- Graduate degree
- Non-degree certification programs

With what race/ethnicity do you identify?

- Asian/Pacific Islander
- Black/African American
- Latin American
- Native American
- White
- Multiple
- Other

For how many years have you been an outdoor educator?

- 0-2
- 2-5
- 5-10
- >10

Thank you for helping us with this survey validation! If you would like to be entered into the \$50 gift card drawing, please click on the link below.

**APPENDIX J**

Frequency Chart for Survey Items

| <b>Item</b>  | <b>1<br/>Strongly<br/>disagree</b> | <b>2<br/>Disagree</b> | <b>3<br/>Slightly<br/>disagree</b> | <b>4<br/>Neither<br/>agree nor<br/>disagree</b> | <b>5<br/>Sightly<br/>agree</b> | <b>6<br/>Agree</b> | <b>7<br/>Strongly<br/>agree</b> |
|--|------------------------------------|-----------------------|------------------------------------|---|--------------------------------|--------------------|---------------------------------|
| I feel a strong attachment to scientific fields.                               | 1                                  | 4                     | 5                                  | 12  | 41                             | 78                 | 68                              |
| I spend my free time trying to find out more about science and science topics. | 1                                  | 5                     | 8                                  | 13  | 72                             | 80                 | 30                              |
| The logic and methods used in scientific fields are exciting.                  | 0                                  | 4                     | 7                                  | 28  | 69                             | 74                 | 27                              |
| I feel the most comfortable when I am outside.                                 | 1                                  | 0                     | 1                                  | 2   | 16                             | 74                 | 115                             |
| I feel a strong emotional connection with the natural world.                   | 0                                  | 0                     | 0                                  | 0   | 6                              | 49                 | 154                             |
| Other people see me as a "nature person."                                      | 1                                  | 1                     | 2                                  | 6   | 6                              | 72                 | 121                             |
| Outdoor education is important for learners' development.                      | 0                                  | 0                     | 0                                  | 0   | 7                              | 62                 | 140                             |
| Advocating for social justice is important to me.                              | 3                                  | 3                     | 0                                  | 9   | 31                             | 75                 | 88                              |
| I participate in environmental advocacy activities.                            | 15                                 | 33                    | 20                                 | 44  | 46                             | 32                 | 19                              |

| <b>Item</b>   | <b>1<br/>Strongly<br/>disagree</b> | <b>2<br/>Disagree</b> | <b>3<br/>Slightly<br/>disagree</b> | <b>4<br/>Neither<br/>agree nor<br/>disagree</b> | <b>5<br/>Sightly<br/>agree</b> | <b>6<br/>Agree</b> | <b>7<br/>Strongly<br/>agree</b> |
|---|------------------------------------|-----------------------|------------------------------------|---|--------------------------------|--------------------|---------------------------------|
| People often label me as an activist.                       | 26                                 | 49                    | 25                                 | 35  | 45                             | 22                 | 7                               |
| My educational philosophy matches my organization.          | 1                                  | 8                     | 10                                 | 17  | 23                             | 70                 | 80                              |
| I have the power to make my own decisions about programming | 0                                  | 9                     | 11                                 | 9   | 31                             | 78                 | 71                              |
| I am respected by my supervisor(s) for what I do            | 3                                  | 6                     | 5                                  | 12  | 15                             | 84                 | 84                              |
| I am encouraged to do professional development.             | 7                                  | 10                    | 16                                 | 25  | 35                             | 65                 | 51                              |
| Educators see value in the programs that I lead             | 1                                  | 4                     | 7                                  | 16  | 41                             | 93                 | 47                              |
| Formal educators look up to me as a source of knowledge.    | 1                                  | 5                     | 7                                  | 25  | 47                             | 87                 | 37                              |
| Educators see the outdoors as a legitimate learning space.  | 1                                  | 9                     | 24                                 | 29  | 65                             | 67                 | 14                              |
| My profession is recognized by the general public.          | 6                                  | 28                    | 43                                 | 35  | 51                             | 39                 | 7                               |
| Formal educators respect me as a professional.              | 0                                  | 6                     | 22                                 | 25  | 46                             | 80                 | 30                              |